THE Chemist

SEPTEMBER, 1944 VOLUME XXI, No. 6

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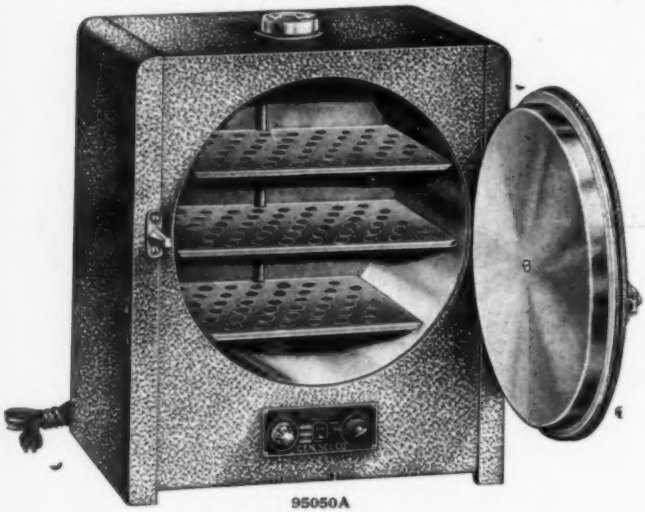

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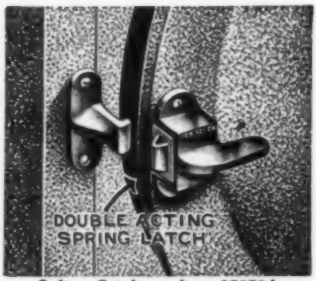

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The Chemist

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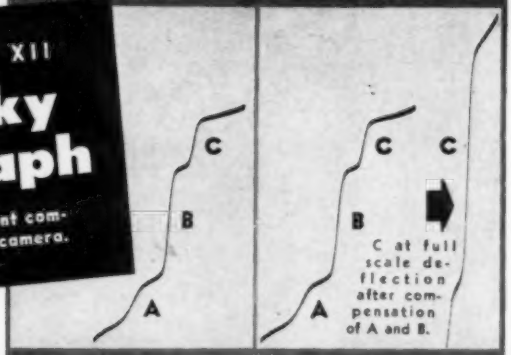

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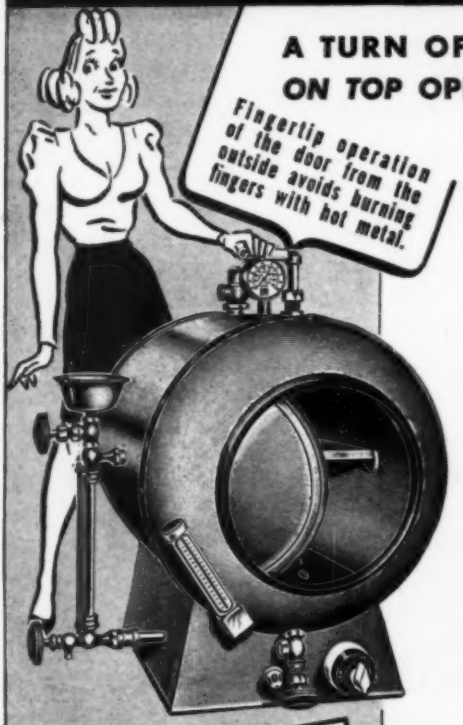

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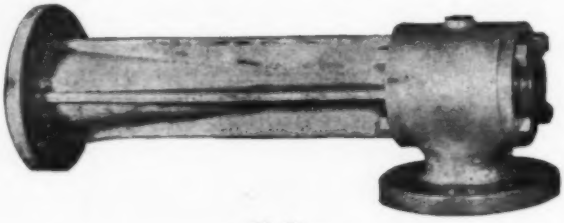

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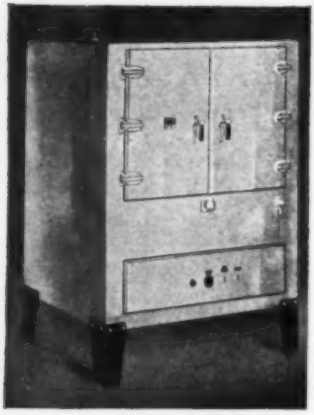

Floor model cabinets are rapidly supplanting conventional table model mechanical convection cabinets because they offer all their advantages, plus space-saving and movability, requiring no bench or table. Five excellent sizes are now offered, the newest additions being Models 848 and 849 listed below. *Details appear in Catalog 325.*

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4. Lower operating costs, because more material can be heat-treated in less time.

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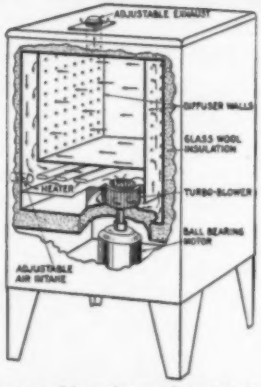
	35-260°C	2600	815
19"x14"x19" Floor space, 30"x22" Overall height 61" Single Door	35-180°C	2700	821
	35-260°C	3900	825
25"x19"x19" Floor space, 36"x27" Overall height 61" Single Door	35-180°C	2700	831
	35-260°C	3900	835
37"x19"x25" Floor space, 49"x27" Overall height 64" Double Door	35-180°C	4100	841
	35-260°C	5300	845
48"x24"x36" Floor space, 55"x32" Overall height 61" Double Door	35-180°C	5300	848
	35-260°C	6500	849



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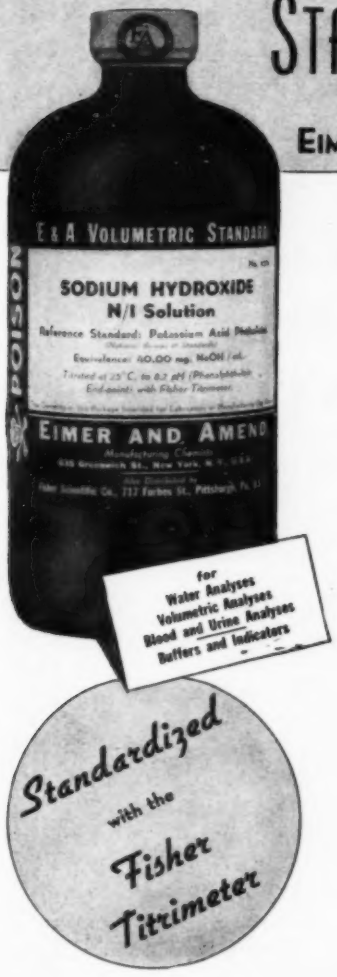

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Patent Problems in America

A. A. Potter

Dean of Engineering, Purdue University and Executive Director, National Patent Planning Commission.

Presented before THE AMERICAN INSTITUTE OF CHEMISTS *at Chicago, Ill.*

THROUGHOUT history man has satisfied his material wants either by exploration and colonization, by depriving others of their property rights through trickery, robbery and warfare, or by creating new wealth through hard work, research and invention.

Our entire social structure has been altered during the last century by inventors who are the true benefactors of humanity and the constructive builders of our civilization. These inventors opened new frontiers and opportunities for abundant life without robbery, trickery, or wars.

Americans, to a greater degree than any other people in the world, are responsible for the epoch making inventions of the past century. Have any people in any other country given as great an impetus to agriculture as did Cyrus Hall McCormick when he invented the reaper in 1833, Eli Whitney the inventor of the cotton gin in 1793, and Oliver who invented the chilled plow in 1868? Have any contributions in the field of electric communication by wire equalled those of Samuel F. B. Morse (telegraph, 1832), Cyrus W. Field (trans-Atlantic cable, 1858) and Alexander Graham Bell (telephone, 1876)?

In wireless communication, the names of Fessenden, Lee de Forest, Alexanderson, Armstrong, Jenkins and a number of others are most significant. From the invention of the steamboat (Clermont) by Fulton in 1811 to the patent for the airplane by Wright in 1903, Americans have been making major contributions to transportation, among which is the electric locomotive by Vail (1851), the sleeping car by Woodruff (1856), the air-brake by Westinghouse (1869), the railway block signal by Robinson (1872), the automatic car coupler by Janney (1873), the trolley car by Sprague (1882), the automobile by Haynes and Duryea (1865) and the gyrocompass by Sperry (1905).

The sewing machine, the typewriter, the adding machine, the cash register, the fountain pen, the camera for films and plates, the linotype, the zipper, the safety razor, the talking machine, and many other devices which are constantly adding to human comfort and happiness were created

by inventors of the United States of America. Americans have also contributed, through invention, to many new manufacturing processes, such as vulcanizing rubber, cracking of gasoline, welding, and the manufacture of aluminum, carbide and plastics.

The American Patent System

The interest of the founders of this republic in encouraging invention is evidenced by the fact that the American Patent System was established by the Constitution of the United States "to promote progress in science and the useful arts." Our patent system has been an important factor in bringing about the rapid industrialization and the high standards of living which our people enjoy.

The American Patent System affords adequate protection for new ideas as an incentive for the inventor to create new machines and processes, and it acts as an inducement to the investor to finance the conversion of an invention into a marketable product. Invention is essential for industrial progress, but not one will spend money on research to produce inventions or to develop and commercialize inventions made by others unless the new knowledge can be adequately protected by patents.

The inventor and those who back him are protected by the American Patent System in order that development, manufacture and sale may be carried on without unfair competition from those who have not shared in the invention or in its development and commercialization.

The American Patent System implies the right of the inventor to keep his discovery secret and offers to reward him for disclosing it. In return for temporary security, the inventor discloses his invention which becomes a part of the public domain upon the expiration of seventeen years. The patent is a reward for the creation of something new, for an addition to and not a subtraction from the public wealth. Disclosure through the patent stimulates and instructs others to invent, as evidenced by the more than two and a quarter million patents which have been granted since the beginning of our patent system.

The American Patent System has facilitated the rapid commercialization of new discoveries in this country to an extent exceeding that of any other land. Has the American public paid too great a price for yielding to the inventor the exclusive right to his creation for a period of only seventeen years? Would many of the modern industries, such as the telephone, radio, and plastic industry, have been commercialized without patent protection?

Improvements in the American Patent System

Like any institution conceived by men, patent systems must be appraised from time to time to make certain

that they are operating most effectively and in the public interest. It must be realized, however, that any changes which would in any manner weaken our patent system would prove particularly harmful to the thousands of small industries which rely upon patented articles and processes to serve the public in competition with large corporations.

It must be realized that ownership of patents and the control such ownership gives over the inventions covered are basic to many industries and utilities which would have never existed without the protection the American Patent System has afforded during the more than 150 years of its existence.

Several different groups have appraised our patent system during the past thirty years and on December 12, 1941, the National Patent Planning Commission was created by the President of the United States, through Executive Order No. 8977, for the purpose of recommending improvements in our patent system to meet the changing conditions and to advise "to what extent the Government should go in stimulating inventive effort in normal times; and what methods and plans might be developed to promote invention and discoveries which will increase commerce, provide employment, and fully utilize expanded defense industrial facilities during normal times."

Improvements in Patent Laws

In its first report, which was presented to the President in June, 1943, the National Patent Planning Commission confined its recommendations to the mechanics of patent law and the use of patents. In formulating this report the following matters were given special consideration:

1. Has Our Patent System Aided the War Effort?

Never before has there been such a free exchange of scientific and technological knowledge and products of inventive genius between our industries and our own Government, and between our Government and our allies. Such a liberal and complete exchange of scientific information and the secrets of industrial and educational laboratories could not have been possible without the reassurance of protection by our patent system.

Present legislation is adequate to serve the Government's war time needs since existing laws permit our Government and its contractors and sub-contractors to manufacture and to use any invention, patented or unpatented, regardless of the citizenship of the owner, upon the payment of reasonable compensation. These laws operate both in peace and in war. Dr. Robert A. Millikan of the California Institute of Technology has recently stated, "When the full story of this war is told, count upon it that Patent Protection will be one of the heroes

upon which a Congressional medal will be conferred by a grateful American public."

2. Does our Patent System Protect Public Interest?

Charges have been made that patents have worked against the public interest in the following ways:

Suppressed Patents. There is a rather general misconception that non-use is necessarily the suppression of a patent. Non-use of a patent, which is not commercially usable, does not involve the willful withholding of its use. Non-use of patents may be usually traced to technical or economic reasons because of which the patents are incapable of commercialization or are at a disadvantage competitively.

Unused patents are found most generally in rapidly developing industries where technical progress is great and where obsolescence is an important factor. It is conceded that in many cases patents are not being "worked," as for a patented invention to be put to use, there must be acceptance by the public of the subject of the invention. If, for any reason at all, the public does not desire the particular improvement, or if there are difficulties of marketing which render it non-commercial, resultant non-working of the patent is to be expected.

In other instances a patented invention may not be used because the organization which produced the idea is not in a position to exploit it. Then market conditions may be adverse or customer resistance may entail excessive costs for merchandising the invention. In some cases patents are shelved for several years after they have been issued pending financial, commercial or technical development. A careful analysis of the above factors justifies non-use of patents and indicates that a patent for which there is a substantial public demand will not long be kept from the market.

Compulsory Licensing. A careful study of compulsory licensing in other countries leads one to conclude that any general system of compulsory licensing is undesirable for the United States from the standpoint of public good. The tendency to compare conditions in this country in respect to compulsory licensing with those prevailing in foreign countries has been misleading, as back of the philosophy of compulsory licensing in other lands was the limited industrial development of those countries and the objective of such compulsion was to force the manufacture of articles within the boundaries of these lands.

Thus the principle of compulsory licensing may have some justification as a measure of self defense in countries of limited natural and human resources, or in those which have a major portion of their industries under foreign control, or in lands which have a considerable portion of their patents granted to foreigners. The following facts with reference to pat-

ents in this country are pertinent in comparison:

(a) The United States grants during normal times more patents per year than any other two of the most industrialized countries of the world.

(b) Nearly seven-eighths of the total patents granted in this country are granted to Americans. More than one-fourth of German patents and more than one-half of the British or French patents, nearly two-thirds of the Italian patents, and over nine-tenths of the Canadian patents are granted to foreigners.

(c) Nearly one-half of all American patents are granted to individual inventors, more than one-third to small industries, and less than one-fifth to large industries.

(d) Compulsory licensing may be necessary in countries which have their industries largely under foreign control. This is not the case in this country.

A general system of compulsory licensing would prove most detrimental to the individual inventor and to the small industry, as the large corporation would, through compulsory licensing, be in a position to deprive those less financially able to enjoy the benefits from their inventions. Furthermore, the rapid growth of our research laboratories requires a type of patent protection which would be denied if a broad compulsory system were adopted.

Harmful Business Monopolies. Charges have been made that patents are being used to create monopolies which are detrimental to the public. The anti-trust laws are intended to prevent injury to the public which may result from monopoly, and apply to patents as well as to other types of property. Judicial decisions have definitely curbed trade practices which go beyond the reasonable exercise of the rights under the patent grant.

Patents have been used in transactions which are open to question under our anti-trust laws. An examination of the relation between patents and anti-trust laws, and the various proposals affecting the former which have from time to time been advanced in connection with implementing the latter, will reveal that there are good license restrictions and patent pools and cross licensing which are definitely in the interest of the public. Again there are bad restrictions and patent pools and cross licensing and other agreements which should be unlawful.

It may also be true that in line with recent developments with respect to patent pools, cross licensing and international agreements, commonly referred to as cartels, the importance of the anti-trust cases which involve patents may have become relatively greater in recent years than theretofore. A digest of 428 cases from the records of the Department of Justice, under the anti-trust laws, for the

period of fifty two years from October 13, 1890, to October 8, 1942, reveals that the patent cases have represented less than ten per cent of all anti-trust cases and are, therefore, not a major contributing factor to unfair competition and restraint of trade.

Limitations of Licensing. It has been charged that by inserting restrictive limitations in licenses patent owners are able to exert control over competition to the injury of the public. While there may be some reason for this charge there is no justification for outlawing all restricted patent license agreements, since many of these have already been outlawed by courts, and the orderly process of judicial procedure is certainly adequate in this country to draw out the line between what is lawful, and what is unlawful; to outlaw blindly the good with the bad will do far more harm than good. Many forms of the commonly used restrictions serve a highly useful purpose and directly contribute to industrial progress.

Recording of Licenses. The chief beneficiary of our patent system should be the American public. Despite the benefits to the general public from the operation of the patent system it is nevertheless true that patents may be and have been abused. The abuse arises not from the patent itself but by virtue of secret, improper, and even illegal agreements. The exposure of agreements dealing with patents should minimize these abuses, and, in any event, make them readily detectable. The commission has accordingly recommended that there should be a compulsory requirement for the recording of all agreements so that they will be available to the public, to governmental agencies, and to Congressional committees.

3. Revocation of Patent Grant. It is generally conceded that the United States Patent Office has a thorough and highly developed procedure for the examination of applications for patents. However, in spite of the efficiency of its classification system and examining technique it is obvious that the examiners are not and cannot be informed as to all existing facts having a bearing upon the novelty or prior use of the thousands of inventions deposited in the office each year. It follows that a patent may be and frequently is granted which would have been refused if the Patent Office had been in possession of additional facts.

Under present conditions no opportunity is afforded the public for submitting evidence to the Patent Office or supplying pertinent facts as to novelty and use prior to the issuance of a patent and the Patent Office itself is powerless to withdraw or to cancel an issued patent however inadvertently granted.

The above facts led the Commission to conclude that it is in the public interest that the granting of the patent should not become final, in so

far as the Patent Office is concerned, until the expiration of some limited period such as six months.

During this period provision should be made for a challenge or cancellation proceedings which could be initiated on any grounds by any party having more than a frivolous interest, and could be joined in by other interested parties. If such opposition is successful the patent would be cancelled by the Commissioner of Patents. The free services of an officer in the nature of a public defender would be made available to the patentee.

4. Public Register of Patents.

The feature of the British patent law commonly known as "licenses of right" seems to be a desirable innovation in our own patent system. "Licenses of Right" provide the means whereby a patent owner can publicly proclaim his willingness to grant licenses under his patent on either reasonable or stated terms.

The Commission recommended that a public register be established in the Patent Office on which patents would be entered on the request of their owners with a statement of terms, if any, on which a license could be granted. The recording of patents on the register should be at government expense and without cost to the patentee.

5. Uniform Standard of Invention.

There is considerable concern on the part of certain groups that the examination given by the Patent Office examiners before issuing a patent is inadequate to insure a high standard for determining whether the contribution reported by the inventor merits the award of the patent grant. There is often wide divergence between the standard of patentability used by the Patent Office and that used by the courts.

Recent decisions of the Supreme Court have led some circuit courts to rule that a patent should not have been granted if the invention is the result of "the slow but inevitable progress of an industry through trial and error." The fear has been widely expressed that this attitude of the courts with reference to the standard of patentability will operate to curtail invention through research and development. The opinion announced by the Supreme Court on November 10, 1941 in connection with the Cuno Engineering Corporation case, 314, U. S. 84, 91,—"That is to say the new device, however useful it may be, must reveal the flash of certain genius not merely the skill of a calling" is most unfortunate in its effect upon the courts and industry.

The "flash of genius" theory is unsound and entirely too restrictive. Unfortunately the publicity given to the "flash of genius" phase is influencing the courts in a manner which is detrimental to the granting of patents for important improvements and for

new devices and processes which are the result of exhaustive research, experimentation and development.

This is particularly unfortunate, as research as a source of invention is becoming more and more important, and in highly competitive industries research is an absolute necessity. Industrial, educational and governmental research laboratories, whose operations range from simple product and process engineering to long range delving into the unknown realms of science and technology, have grown rapidly all over the country.

The function of the patent system in providing protection and security for the tremendous investments essential to these various kinds of research activities has come to equal if not actually outstrip in importance its original function of holding out a reward as an inducement to invention and research. No single factor will contribute more to the fullest utilization of our country's expanded defense facilities in the post-war period than the encouragement and maintenance of research facilities of our country.

While those interested in industrial progress are in favor of enhancing the quality of inventions for which patents are granted, they are convinced that many improvements in existing devices and many new devices and processes, which are based on painstaking research, are fully as worthy of patents as are those inventions which are considered "flashes of genius." "Flashes of genius" cannot alone be depended upon to develop new devices in the field of electronics or to benefit the public through the development of new and useful synthetic materials and complicated chemical processes which deserve patent protection to advance science, industry and commerce.

On the subject of standard of invention the National Patent Planning Commission has made the following recommendations:

a. *Declaration of National Policy.* It is inconsistent with sound national policy to continue to grant patents with existing uncertainty as to their validity, and unfair to the inventors of this country and to manufacturers and investors who have proceeded on the basis of a protective security in the form of a patent issued to them by the Federal Government. The Commission feels that not one but several steps should be taken to remedy the present situation.

A promising improvement would be for Congress, by legislative enactment, to lay down a reasonable, understandable test by which inventions shall be judged both from the standpoint of the grant of the patent and the validity of the patent there-after. The Commission, therefore, recommended the enactment of a declaration of policy that patentability shall be determined objectively by the nature of the contribution to the advancement of the art, and not subjectively by the

nature of the process by which the invention may have been accomplished.

b. *Validity Questions Should Have the Advice of the Patent Office.* The power to grant patents for inventions is vested by our Constitution in Congress and not in the executive or the judicial branches of our Government. Congress has delegated the power of granting patents to the Patent Office which makes the judgment of the Patent Office the cornerstone of our patent system. Seldom, if ever, is an issued patent declared invalid by a court on the basis of the same facts and record known to the Patent Office at the time of the grant. The provision of a definite yardstick for determining the existence of an invention is not alone sufficient. There must also be some assurance of a uniform application of the yardstick.

The validity of a patent is now passed upon initially by any one of almost a hundred district courts in the United States, by eleven different circuit courts of appeals and occasionally by the Supreme Court. The test of invention should be the same and uniform whether applied in the Patent Office or in any one of these courts. The only divergence in opinion should come from a divergence of facts. If, during the adjudication of a patent before a district court, new facts and evidence unknown to the Patent Office are submitted, the Patent Office should have an opportunity to revise its former opinion and to restate its conclusions on the basis of the additional information.

The Commission, therefore, recommended that whenever the validity of a patent is attacked in an infringement suit before a district court the court shall certify the record to the Patent Office for a Report on the validity of the patent. The report of the Patent Office as to the effect of the court record upon the validity of the patent shall be advisory only.

c. *Creation of a Court of Patent Appeals.* As a final step in remedying the confusing conditions surrounding the grant and validity of patents the Commission has recommended the establishment of a single court of patent appeals which would receive and decide appeals from all of the district courts in patent cases, and whose decisions would be effective not only in a particular circuit but throughout the whole United States. The creation of an entirely new court is not necessary.

The Commission recommended that the jurisdiction of the existing Court of Customs and Patent Appeals be expanded so as to function as such a court, that provision be made for the court to sit elsewhere than in Washington, and that additional judges be temporarily assigned to the court by the Chief Justice of the United States in such numbers and for such times and at such places as the public interest may require.

6. Early Termination of Patent Grant.

It is desirable in the public interest to avoid deliberate delays after a patent application is filed. A proposal of long standing is that the patent monopoly shall not endure more than twenty years from the date of its filing in the Patent Office. This plan recognizes three years as a reasonable period for prosecuting an application to allowance. There would be no change in the present seventeen year period of a patent in those cases in which prosecution did not consume more than three years.

Any delays beyond that period, however, would ordinarily subtract from the duration of the patent. Thus, if an application were pending for five years, the life of the patent would be reduced to fifteen years. This proposal also includes a provision for two additional years to the life of the patent, if a delay of more than three years has been due to causes beyond the control of the applicant, as it would be unfair to penalize applicants by the operation of the twenty-year law because a case encountered delays in the Patent Office.

Government Owned Patents

The Commission has now under way a study directed to the policies involved in connection with inventions made by Government employees and by agents and contractors of the Government, and with the control and use of patents owned by the Federal Government. While this study is incomplete an unofficial explanation of the factors which are receiving consideration by the Board may prove of interest.

During the earlier part of this phase of the inquiry, the Commission had recommended to the President the establishment of a central register to collect and coordinate information with respect to licenses which the Government has acquired in connection with its procurement problems and information regarding patents owned by the Government. The creation and maintenance of such a register in the Patent Office has been directed by Executive Order 9424 and the work of establishing the register is under way.

Inventions by Employees of Government

The Government is at all times carrying on, directly and indirectly, research which results in a considerable number of patentable inventions. Some of these inventions relate to national defense, public health and public safety; other inventions may be of special value to private enterprise and only of remote interest to any governmental activity; and still other inventions may be of interest to both government and private enterprise.

In general, the Government stands in the same relations to its employees in regard to inventions developed by

the latter as do corporate employers. The two extreme cases, the one where an employee is hired to invent, and the other where an employee makes an invention not related to the field of his employment on his own time and using his own resources are fairly susceptible to uniform treatment. The cases between these extremes require a type of individual treatment which encourages creative effort on the part of the employee while protecting the Government as representing the public interest.

Government Sponsored and Subsidized Research

Government sponsored and subsidized research is carried on at all times by contractors of government and educational institutions. A particular contractor, a university or other types of existing facilities are usually selected by the Government because of an accumulation of knowledge, experience, and special facilities of peculiar value in the development involved. In some cases the research involved may be only a further development and refinement of work already done by the contractor while in others the contractor may be investigating a totally new subject.

It appears, therefore, that in some cases complete ownership of patents by the Government, with a royalty free license to the contractor may be required, while in other cases ownership of patents by the contractor with freedom to use the invention by the Government royalty free for its own purposes may be desirable.

The Patent Rights of Government

Industrial organizations have a need for the exclusive right conferred by a patent to protect their business. In the main, the proprietory interest of the Government in patents has only been concerned with protection in the performance of governmental functions. That is, the Government should not exercise the right conferred by the grant of a patent to exclude others from its use.

The Government should only be interested in quick and wide use of its patents for public benefit. It is reasonable to conclude that in cases which require secrecy in the interest of national defense the Government should have full rights not to disclose the invention as long as such protection is desirable.

Stimulation of Inventiveness

The most important phase of the assignment of the National Patent Planning Commission is covered in the last part of the President's order and relates to the problem of stimulating inventive talent for the purpose of utilizing the expanded war industries during the post-war period. What should our Government do to stimulate inventive effort and what plans and incentives should be developed to encourage research and invention which will increase commerce, provide employment and fully utilize defense

industrial facilities during normal times?

Probably one of the greatest incentives to invention is a sound patent system. Among the many other incentives considered the following are examples:

Government subsidies to research agencies and to inventors to develop their patents.

Stimulate creative interest in children through hobby clubs, hobby shops, and by interesting them and their parents in inventors and inventions.

Give greater publicity to national creative heroes, such as Franklin, Morse, Bell and Edison to take the places of movie stars in the minds of our school children.

Inspire the youthful genius through special clubs such as "The Innovator's Brotherhood."

Encourage the creative teacher.

Give greater attention to the training of inventors in scientific and engineering curriculum of colleges and universities.

Encourage suggestions for new things through special awards by Government and private industry.

Encourage all industry, small as well as large, to improve their methods, practices and product through research. Industries employing fifty or more persons should have at least one well prepared and research minded person engaged in discovery and improvement.

Encourage new enterprises by removing corporate tax handicaps to new business.

Recast the National tax policy to encourage gifts for research and experimentation.

Establish a peace-time agency similar to the Inventors Council to aid in bringing together those who invent and those who can commercialize the invention.

The problem of stimulating inventiveness is of special concern to the public at large, if the technical skill and equipment which we are now building up to meet the needs of the war effort are utilized most effectively to provide full employment and a higher standard of living when peace becomes a reality. For our country to grow and prosper we must have more epoch-making inventions fully protected by a sound patent system. War incentives have stimulated invention, resulting in new devices of great value to our armed forces.

While some of the inventions of the past few years must remain military secrets, many others should be protected by patents in order that they may be commercialized for the benefit of humanity. It must also be realized, however, that new wealth to replace the losses we are suffering in this war can come only through the research laboratory.

A sound patent system is the very life blood of many of our industries and is absolutely essential for the

protection of the investment in research laboratories, which are bound to be our most important assets in utilizing most advantageously our present expanded industrial facilities in the post-war period.

Dow Corning Begins Quantity Production of Silicones

When William J. Hale wrote "Chemistry Triumphant" in 1932, he prophesied that the 1950's would be the "Silico-Plastic Age," wherein the molecular units in plastics would contain silicon to give them improved strength and resistance to oxidation and temperature. The future of this merger between the organic and the inorganic would offer astounding possibilities for man-made materials.

The Dow Corning Corporation of Midland, Michigan, has just announced that it is beginning quantity production of silicones, which are the result of long research to utilize silicon and oxygen in the production of temperature-resistant materials, either in the form of solids or liquids.

Some of these organo-silicon products have been available for several months, under the name of Dow Corning Fluids, to a few secret war-applications. From these liquid polymeric silicones stemmed the high temperature silicones for electrical insulation. One type is an impregnating varnish which is applicable to Fiberglas, asbestos cloth, or other materials. Another silicone product is a grease which is particularly useful in plug cocks which operate at high temperatures or are subject to corrosive chemicals.

Research on the Dow Corning Fluids was started in the Corning Research Laboratories and continued by the Corning Research Group at Mellon Institute. Semi-commercial production was continued at the Dow Chemical Company.

The Dow Corning Corporation was formed in February 1943, and is now starting the commercial production of silicones at Midland, Michigan. The silicones will be made available for war purposes to which their properties are adaptable, including temperature stability, inertness, and waterproofness.

New Products Announced

Magnus, Mabee and Reynard, Inc., 16 Desbrosses Street, New York 13, New York, announce a new perfuming principle for insect spray toxic agents, to be known as "Perfume Oil Fruit Berry M M & R." Samples will be supplied on written request.

The same firm also announces a new neutralizer for isopropyl alcohol without adding perfume, called "Neutralizer IA, No. 1, M M & R." Testing samples are available on request to the company.

G. C. Supplee Research Corporation Formed

G. C. Supplee, F.A.I.C., is now head of G. C. Supplee Research Corporation, with offices and laboratories in Bainbridge, New York.

This organization provides consulting, analytical, and vitamin technological service to food, pharmaceutical, and biological industries, and also conducts independent developmental research.

Dr. Supplee was recently director of the biological and chemical research laboratories of the Borden Company.

Other officers of the new organization are V. J. Ashbaugh, executive vice president; C. B. Martin, secretary; Howard Hinton, treasurer, and E. C. Rowe, chief counsel.

Dewey to Receive Chemical Industry Medal

Col. Bradley Dewey has been selected by the American Section of the Society of Chemical Industry to receive its Chemical Industry Medal for 1944, in recognition of his work in colloid chemistry, especially as pertaining to rubber latex.

The Soaring Society of America, Inc., met August fifth and sixth at the Polytechnic Institute of Brooklyn, New York, at a conference where technical papers on motorless flight were presented.

D'Alelio Appointed Vice President

G. F. D'Alelio, F.A.I.C., director of chemical research of the Pro-phy-lac-tic Brush Company, Florence, Mass., has been made vice-president of the company. Dr. D'Alelio will continue to serve as director of research in addition to the vice-presidency.

Society of Chemical Industry Elects Officers

The American Section of the Society of Chemical Industry announces the election of Dr. Norman A. Shepard, F.A.I.C., chemical director of the American Cyanamid Company, as its chairman and Mr. Frank J. Curtis, vice president of Monsanto Chemical Company, as vice chairman, to serve until July 1945.

Cyril S. Kimball, F.A.I.C. and J. W. H. Randall, F.A.I.C. were re-elected honorary secretary and honorary treasurer, respectively. The following were elected as members of the Executive Committee: J. L. Bennett, P. K. Frolich, F. D. Snell, F.A.I.C., W. B. Wiegand, F.A.I.C., and E. C. Williams.

Hofstra College Elects President

Dr. John Cranford Adams was elected president of Hofstra College, Hempstead, New York, in August, according to an announcement by the trustees and faculty of the College.

Post-War Opportunities for Women

Walter J. Murphy, F.A.I.C.

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"GRIN AND BEAR IT" is the title of a daily cartoon by Lichty which many of you may have seen at least occasionally. Recently it pictured two curvesome young ladies scanning a bulletin board literally covered with announcements of attractive positions in industry, open to them, promising good salaries and a post-war future.

Both looked as though they were victims of some colossal injustice, and one was complaining, "There used to be more *opportunities* for a girl. Of course there *are* all kinds of *jobs*, but there used to be a choice between marriage and a career."

I am not presuming this to be the reaction of all women graduates today, but it does emphasize a fact, which is that the war has brought a change in the status of a woman looking for a job today—whether she looks for a temporary or a lifetime career. The question is: Is this a war change only, or will there be some ptrmanency to this present, pleasant aspect of a woman's search for work in the industrial world?

Let me go back a bit to point out what has been happening in the chemical industry to change the woman's opportunities there.

In 1937, when UNEMPLOYMENT, not DEFERMENT, was precipitating crises in the lives of young chemists and chemical engineers, the American Chemical Society inaugurated a service for employees and prospective employers which has since become the Society's well established Employment Clearing House. This is conducted in conjunction with its semiannual national meetings, and interviews between candidates for jobs and prospective employers are arranged. Each year has seen an increase in the number of registrants, but the problems of the unemployed have given way to problems of the employer.

War today cannot be waged without the chemist. He not only has devised the processes, but he must be on hand to oversee the production of synthetic rubber, high octane gasoline, ex-

* A talk given at a vocational symposium conducted during the annual meeting of the Institute of Women's Professional Relations, held at the Mayflower Hotel, Washington, D. C.

plosives, dehydrated foods, penicillin, antimalarials, sulfa-compounds and other materials essential to modern warfare. Consequently gigantic war production programs have brought a need for additional highly trained personnel in many chemical plants.

More recently the problem of replacements has been added because many chemists under twenty-six have been called to the combat army. This is not the place to dwell on the lack of vision in such a procedure, but it is clear that the increased demand for chemists and chemical engineers together with a diminishing supply has noticeable effects.

Thus, as in the last World War, we find employers in chemical industries looking about for pinch hitters. Beginning shortly after the outbreak of the war in Europe they came to the Society Clearing House to ask in hopeful, somewhat dubious tones, "Have you any *women* chemists listed? "How about seeing your records on women chemists?" "You don't suppose you can find me a good *woman* chemist the draft won't take?" "Where are the women?" With slight variations the questions and requests have been repeated with increasing frequency at each meeting to date. In some instances an employer has indicated himself as a satisfied customer by asking for "records of some *other* good women chemists."

In others there is proof that one of the old hazards still confronts those who employ women when the employer sadly reports that "we had two good ones, but they left us to get married." Nevertheless the inquiries for women continue and emphasize at least two interesting facts for women who contemplate careers in chemical industry.

First, it is quite apparent that women are in this war period entering for the first time into organizations never before open to them. Not only have chemical laboratories developed-since-the-last-war given women an initial trial, but some of the long established concerns are also experimenting with women chemists for jobs held by men only up to now. Further, organizations which have employed women in certain limited capacities are shifting them to other jobs, and with it all comes a broader horizon for the woman chemist at large.

All of this adds up to a golden opportunity for women to show what they can do in such jobs, for at no time have women been so eagerly sought for industrial posts, and employers been so willing to take chances on their abilities or so disposed to give them proper credit for their work if they prove themselves capable.

Looking at this situation from the woman's standpoint, there is of course an element of unfairness in the test to which they are now being subjected. As the American Chemical Society points out when pleading for deferment of all technically trained men,

a chemist is not created overnight. It would, then, be foolish to expect that the comparatively small number of women chemists who *have* adequate training can take over the available jobs in chemical industry as easily as the housewives are taking over spot welding.

However that may be, the fact remains that now is the time for women to take inventory and plan for their postwar future. Now is the time for them to find out just what women are doing in industry today. Now is the time to find out where they are succeeding, where they are failing, where they can do work heretofore delegated solely to men, where they cannot, where they excell, where they fall short.

Certain chemical industries have been forced by circumstance to open their doors to women for the first time. In these cases it means, naturally, that they now possess facilities not needed before. Even such a seemingly small adjustment as the provision of necessary rest rooms for women has in peacetimes often been an effective barrier against initial hiring. Where that barrier is down, the retention of women will to a large extent depend on what they have shown themselves capable of doing in the emergency period.

Those organizations which have shied away from hiring women for one reason of another now have an opportunity to put them on trial. In some cases we will find that old prejudices are completely wiped out. In others old difficulties persist, but now is the time to find out what they are and what, if anything, can be done to remove them. The time for such investigation is NOW, not when the war is won, NOW, not when returning soldiers may confuse issues and again place women at a distinct disadvantage in the business of getting a job in industry. NOW is the time for women to take stock and plan—carefully, energetically, and above all REALISTICALLY.

If we go back as far as 1933, which you will remember as a year when neither women nor men were being particularly harassed by employment offers, we find an interesting survey made on "Occupations and Earnings of Women in Chemistry" by Helen L. Wikoff of the Ohio State University.

Information was based on reports by 353 women chemists, of which 205 were teachers, 41 government employees, 36 chemists in medical or related fields, 52 in industrial or commercial concerns, 10 librarians, and 9 members of editorial staffs. Only two persons without college degree were included. There were 80 with bachelors degrees, 121 with Masters, 146 with their Ph.D., one an M.D., two with LL.B. and one with the Chemical Engineering degree. From these figures it is obvious that the teaching profession offered more openings in 1933 than any other single field. The

report also noted that the Ph.D. degree was a prerequisite for the more desirable positions in colleges and universities and graduate degrees prerequisite for all types of research work. The best openings for women chemists without graduate degrees appeared to be commercial and clinical laboratories.

In regard to salaries, approximately one-third earned less than $2100 in the year reported (which we must remember was 1933). Two with bachelor's degrees received more than $4,000, while four with master's degrees were in the same bracket. Fifty-seven per cent of those with the Ph.D. degree earned $3,000 or *more*.

Today these figures are significant only as a basis for comparison. I know of no up-to-date survey for the purpose, but it is certain that one would show that the ratios of 1933 have been changed, by recent events if by nothing else. Whether the years following the present war will see a return to the depression distribution is something which is largely up to the women, determined to a considerable extent by their performance in these times.

During the last war, also, positions in actual wartime and in the immediate postwar period were filled by women who had had courses in chemistry but who were not specially trained. With the return of demobilized chemists many of the untrained workers withdrew from the field. Others returned to universities to work for higher degrees. It is the latter group which is chemistry's concern today. These and the young women just entering college are the ones who must prepare now for their future, looking toward the time they follow the well-established paths for women chemists, create new openings which suit their special talents and personalities, or compete with men for the jobs which men now dominate—or at least have up to now.

It is not, a reflection on the woman chemist to say that a large number will find satisfaction in occupations which *they* have dominated in the past, even though such domination has involved no competition with the male. I do anticipate an ever-increasing need by industry for chemically trained personnel—for technical library work, for patent researches, for advertising and merchandising of consumers products of chemical parentage and in related fields. The tremendous increase in technical and patent literature and the importance of such literature to modern research and development give rise to a considerable demand for qualified personnel.

It is work which women in general find interesting and the opportunities for advancement are not too limited. In the "Fortune Management Poll" conducted by *Fortune Magazine*, executives were questioned as to businesses or fields holding the greatest promise for the future. In its report

in the May issue, chemical industry heads the list, and the editors remark "The chemical industry was almost too obvious to mention.- It has made such a name for itself in recent years, in fact, that it put the other fields here in the shade." Merchandising, however, was second, and well up on the list, and that indicates another career possibility for women chemists.

In the field of consumer products there has already been a decided shift in merchandising techniques of late, and while we have ample evidence on the radio commercials that technical advertising has not eclipsed BALLYHOO, a beginning has been made. Women who combine technical knowledge with imagination and an ability to speak or write have here a field which needs to be cultivated but which promises to be fruitful. Increased public interest in nutrition and health problems will see a corresponding demand for technical personnel in these fields. And of course with all of these growths will come a corresponding need for qualified teachers.

Without a crystal ball, the postwar opportunities resulting from new developments are impossible to foretell with any degree of accuracy. Anyone who knows the chemical industry knows that it is a most unpredictable one, but the achievements of the past, though surprising many times, have been gratifying on the whole. For example, when plastics were first manufactured on commercial scale it was thought their great mission would be to replace china and glassware. We are all familiar with the plastic equipment of the kitchen and with the picnic kit, but everyone knows that that is a minor item for the plastics industry, even when it contracts to make "chow" plates for the armed forces. Far more important are other plastic products which in wartime range from bomber noses to millions of M-52 trench mortar fuses, and already have so many peacetime applications that some feel we have seen the advent of the Plastic Age.

Another unpredicted miracle of chemistry resulted in nylon. The original research was undertaken in an effort to gain a better understanding of the then little-known field of polymerization—that is the union of small molecules to form larger ones such as found in rubber, resins and cotton. The potentialities of nylon have only begun to be uncovered, and it is certain that the postwar period will see much expansion here.

There are many other examples which could be cited to prove that chemistry is never static and that its need for technically trained personnel, both men and women, is ever increasing.

The jobs for which women will have to compete with men is where women feel they have been most discriminated against and where the champion of women's rights finds ammunition for her campaigns for equal-

ity between the sexes. In chemistry, too, we find women resenting the preference which employers have given to men with no more training and experience than women, often less. These women chemists say they do not wish to be regarded as "women chemists" but as chemists and to be accepted on an equal basis with men and to receive equal pay for equal work.

That is a fair expectation and should be realized. But, it is feasible only if women are willing to adopt a definitely *realistic* attitude. For one thing she must prepare to meet the professional requirements of chemists. The field of chemistry has become a highly specialized one and this trend will continue to grow by leaps and bounds in the postwar period. Fifteen or twenty years ago practically all training given to chemists was based on the assumption that they would become analytical chemists, certainly at the start, and that later a certain percentage of these would develop into research chemists.

As a result, our analytical laboratories were almost wholly staffed by those with at least a Bachelor of Science degree. Certainly in the beginning, the "interne" so to speak, performed work of a routine and repetitive nature. In the past decade or so tremendous advances have been made in systematizing analytical procedures and a great many of these are now so highly developed that they can be performed by those who may not be qualified chemists, but are more appropriately designated as laboratory technicians. Numerous instruments and much scientific apparatus have been developed requiring such technicians and here we find that women serve a very useful function.

However, I do want to point out very clearly the sharp line of demarkation which now exists in our laboratories. There is a decided distinction between laboratory technicians and chemists. Women must then, decide whether they wish to become laboratory technicians or professional chemists. The path for the former is now a relatively easy one to tread. Attainment of the latter status requires highest skill, long preparation and all of the highly important attributes of training, imagination and perseverence.

Accordingly, any woman seriously contemplating the career of a professional chemist or chemical engineer should see that her college is chosen with that in mind. Some years ago the American Chemical Society appointed a committee on Professional Training of Chemists. The result has been the accrediting of certain institutions for the training of those intending to become chemists or chemical engineers.

Logically any chemist-candidate, man or woman, should consider these institutions before undertaking the initial training, which leads to a career in chemistry. Also under present

conditions it is desirable that women who seriously contemplate a career as a professional chemist or chemical engineer should, if at all possible, pursue her academic training in co-educational atmospheres. Here she will immediately understand the significance of competition with male chemists and chemical engineers. She will receive her initiation at the most opportune time, when she is mentally in her most active, formative stage.

By taking undergraduate work in such institutions she will be spared the shock of discovering the highly competitive situation after she starts working at the laboratory bench with men. She will learn their language (at least the technical part of it) and will have a natural facility for the jargon of the laboratory which will make her more readily accepted by her male colleagues and competitors. This is not intended to disparage women's colleges and universities, but simply to point out the drawbacks inherent in a situation which cannot simulate conditions with which women intending to work in the business world of chemistry will have to contend after graduation.

Naturally it would be unwise for anyone to plan for a career in chemistry or chemical engineering without having some rather definite assurance that she is "science-minded." Aptitude testing which has been proving helpful to the training programs of war production will doubtless be of great value in determining whether or not the would-be-chemist posesses the natural bent to justify training, which at best is rigorous.

But even with equivalent technical training, it is important that women competitors know some of the reasons why employers have preferred men, aside from their well known excuse that women are likely to abandon their careers overnight in favor of marriage and the home. The president of a large chemical company, with many men and women on its staff has pointed out these general complaints which important executives and directors of research make about women. They should not be overlooked by women even though they do not apply personally. Here they are:

1. Women do not show teamwork to the same extent as men.
2. Women do not like to work under another woman's supervision.
3. Women lack the aggressiveness of men. Aggressiveness in this sense implies an interest in work which becomes a driving force to impel an employee to do not only the work at hand but to plan to get to and through the next step. Some employers of course make capital of this characteristic which keeps women content with so-called bench work for a longer period than men.
4. Women also lack the focused type of imagination which men possess in general. They have, it is true, a more active imagination, but it is

often of the "scattered" type not so useful in chemical industry even though ideal in many situations.

As I intended to make clear earlier, women as individuals may not merit the aforementioned criticisms. But, if they are realistic they will take them into account in their associations with men, and if necessary, make adjustments accordingly to the best of their abilities.

Too much has been said, perhaps, on the career versus marriage handicap of women, but I should be decidedly unrealistic in my remarks if I did not point out here that both women in chemistry and their employers freely admit that one very great trouble in treating men and women on an equal basis is the ever-present marriage problem. While equal pay for equal work should apply, it is extremely difficult, actually, to withhold the premium for likelihood of long service after hiring. It is true that there are many women chemists who do not marry, but spend their lives as definitely career women.

There are others who marry and successfully continue their careers. But that is not true of the majority of women, and for that the lesser number still pays a penalty. An employer who hires a women gambles against marriage which may take his prize away. And . . . how many women are willing to assure a prospective Boss that no PRINCE CHARMING will come along to take her from him? Realistically we must still make allowances for him, since we know what he does to many a career ambition, and many an employer's staff. In all fairness we should try to see that undue advantage is not taken of those who chose careers and therein find their life-work.

Quite seriously I am confident that opportunities for the woman in chemistry in the postwar world will be bright. Her immediate status will be governed somewhat by what she has proved herself capable of doing in the emergency period, particularly in jobs not heretofore open to women. The ever-widening horizons in chemistry are sure to bring with them new fields for women.

And, for those who would be known as chemists rather than "women chemists" there will be increasing opportunities, too, provided they not only demand equal consideration and compensation but come with qualifications which are equivalent to those of the opposite sex and allow themselves and their work to be measured by the standards of the professional chemist.

Women's Work and Education, news-letter of the Institute of Women's Professional Relations, features an article by Major Alan L. Chidsey, A.G.D., on "New Emphasis in Teaching in the Army Specialized Training Program."

Post-War Enemy Number One

Otto Eisenschiml, F.A.I.C.

WHEN Germany has been conquered, what plans shall we make to insure a lasting peace?

Scientists, technologists and engineers who have done so much to win the war should have a prominent voice in the winning of peace; for successful peace like successful war depends upon the proper application and evaluation of science. Scientists as well as others may disagree on the proper solution for controlling Germany, but an agreement may be reached or approximated by a thorough discussion of the issues involved.

To obtain suggested plans for peace terms from chemists and chemical engineers, THE CHEMIST is printing "Post-War Enemy Number One" in the hope that it will arouse a thoughtful and productive response.

THE Germans are not beaten yet but, barring a miracle, they can no longer win. It is time to think of peace terms.

When Rome was young, its army once was captured by a neighboring tribe. The victorious general asked his father what to do. "My son," said the old man, "you can do either of two things. You can send the Romans home, and load them with presents, making them your friends; or you can cut off their heads and there will be no more Romans." The son, thinking himself wiser than his father, chose a middle course. He disarmed his prisoners, humiliated them by making them walk under a yoke and then had them whipped out of camp. The next year the Romans came back and annihilated him and his tribe.

The comparison with the Versailles peace treaty is too obvious for comment.

No one intends to repeat the mistakes of 1919. Everybody is more or less agreed that the Germans must be decapitated, not literally, but in the sense that they will no longer be able to instigate other wars for a long time to come. This aim is the acknowledged crux of the coming peace; only its attainment is a matter of dispute.

Shall Germany be dismembered? Separate the Prussians from their southern brothers? The idea sounds

intriguing and may work for a while. After that, ways can be found to re-establish unity. When Austria was denied *Anschluss* to the Reich, she lowered her customs barriers and adjusted her judicial system to parallel that of Germany. If customs and passports had been abolished and the German monetary unit been adopted, it would have completed a practical union between the two countries. Can a reunion of the German states be prevented if they should try it along similar lines, as they most likely will?

Supervision of Germany's schools? Yes; this will undoubtedly be beneficial, but only superficially so. The Allied nations may write future German schoolbooks, but they cannot place supervisors in every schoolroom, nor can they control the influence of millions of parents who may preach hatred, vengeance or plain Nazism to their children at home. It is well to remember that the losing side of a war never forgets. We in the north have long ceased talking about the War Between the States, but it still is easy to stir up a heated discussion on it south of the Mason-Dixon line.

Disarmament? Or course. But disarmament was tried after the First World War and failed. Forbidden to build battleships larger than 10,000 tons, the Germans built their famous pocket-battleships, which are still considered among the most formidable instruments of war. Their army was reduced to a police force of 100,000 men, but it was recruited exclusively from former commissioned and non-commissioned officers, and thus formed the nucleus of the best army the world had seen up to the outbreak of the present conflict.

Alliances? Not worth the paper that bears the signature. *Treaties?* They are contracts without a judicial arbiter to enforce them.

If we force on our enemies dismemberment, supervision of schools, disarmament and any number of other things that have thus far been proposed, we still have not eliminated their lust for revenge, and there is no apparent way in which this can be accomplished. By shutting off their obvious channels for a military comeback, we shall only drive the German efforts underground. Manacled on hands and feet, caged within the confines of a small territory, they will use against us the only thing we cannot fetter, their brains.

German scientists will work day and night to perfect some new and terrible weapon, to be employed either for conquest, or, if that is not feasible, for revenge. *If we want to be certain that German genius, the existence of which no one denies, is held in bondage, we must close the scientific laboratories of our enemies,* thereby making it difficult, if not impossible for them to hurt or destroy us by startling scientific discoveries.

The argument will be raised at once that if we did this we would not only

inflict grave injustice on a conquered foe, but ruin his chance to re-establish himself in the world. Well, what of it? The German have not hesitated to close the Czech University of Prague and to burn the one at Naples. What they have done to other institutions of higher learning is not so well known, but it is certain that neither freedom of thought nor freedom of research has lately been included in their curriculae.

For years before the outburst of this war, the freedom of universities in Germany itself was severely restricted. Since there is no way of controlling the work done within the walls of laboratories, the only prevention against their being used against us is their abolition. Such a procedure is not dictated by a desire for punishment, but by the simple law of self-preservation.

What weapons could the Germans develop in secret if we left them to their own devices? No one can be sure of the answer to this question. Science has made such rapid progress under the pressure of war necessities that what looked impossible a year ago may be commonplace tomorrow. New avenues for scientific accomplishments have been opened that are bewildering. If the Germans, for instance, could beat us to a successful disruption of the atom, thus releasing undreamed quantities of energy, we might become as helpless as if they discovered the much talked about death-ray.

Those who believe that to deprive German youth of university training in chemistry, physics and related sciences would mean depriving them of the opportunity to develop their minds, may feel at ease. The Germans would still be permitted to attend courses in mathematics, philosophy, medicine and poetry. This is more than the Nazis have conceded to the nations on whom has fallen Hitler's heavy hand. If the further question is raised as to how Germany can exist without chemical industries or others based on scientific control and research, we shall reply that this is Germany's problem.

There are two ways open to us: Either our merciless verdict will be that after this war Germany is not to be allowed such industries. Let her people turn to agriculture, weaving, or the export of fancy vests. This is the fate they decreed for France and other conquered countries.

Or, we may allow them industries which require control laboratories; but in that case these laboratories should be manned by chemically trained officers of Allied armies, whose allegiance is to their own governments, and who will furnish the industries to which they are assigned no more information than is vital to keep their plants in proper working order. No German should be allowed inside these laboratories.

That clandestine laboratories would

spring up in Germany in defiance of official prohibition may be taken for granted. The difficulties of equipping and maintaining them, however, would be enormous, both in regard to men and apparatus. It is one thing to conduct experiments in the open within the wide, well-equipped halls of an internationally known, richly-endowed college, and another to carry on important work by subterranean methods, without friendly contact with other scientists, without scientific journals, without meetings, and when the acquisition of every glass tube, every book, every foreign journal is a hazardous undertaking.

One may blend whiskies in a basement speakeasy, but to bring world-shaking discoveries to successful fruition there is well-nigh impossible. But even if German scientists were able to work out plans of destruction, in spite of all obstacles, the quantity and quality of their scientific output would be only a small part of what Germany could accomplish if we left their laboratories in full operation for a pursuit of vengeance.

Even high school laboratories should be taboo. In the hands of a desperate prisoner, locked up in his cell, a small saw and a monkey-wrench may become potent instruments. All scientific laboratories in Germany, without exception, will have to be abolished if we are to have peace for a reasonable length of time. If we decree that German youth shall be denied the study of chemistry, physics, bacteriology and other sciences necessary for modern or future warfare, there will be no need for these laboratories. It may even be advisable to deport present German scientists to places where their talents could be directed or, if necessary, forced into inoffensive channels.

If we do all this, the Germans would not only be handicapped in preparing for a new war, but they would soon be hopelessly outdistanced if such a war would occur. Laboratories, scientific staffs, and chemical industries cannot be created with Aladdin's lamp. No matter how good the German armed forces were, they would not be able to cope with an enemy backed up by superior technical brains and equipment. This superiority, moreover, would grow during the hostilities in proportion to the power of scientific forces engaged on both sides.

If we, our children, and grandchildren are not to live in constant dread of a new secret weapon, German science must be completely sterilized. A peace treaty overlooking this factor will be as faulty as the one of 1919, and may lead to serious, perhaps disastrous consequences.

Ehrmann with S. H. Kress

Rolfe H. Ehrmann, M.A.I.C., has joined the staff of S. H. Kress and Company, New York, N. Y., as chief chemist.

What is Powder Metallurgy?

Walter J. Baeza, F.A.I.C.

President Industrial Research Company, New York, N. Y.

FOR the experts, few of my remarks will be of great value, but I hope that some of the information brought to the rest of you, will start you to finding applications for the new techniques, which are placing powder metallurgy products in a very wide variety of industries.

Briefly, we have here an extremely simple technique. Metal powder is poured into a mould which because of its strength and general design, is perhaps more properly called a die. In this die it is compressed under pressures varying with the metal and with the purpose for which the final product is to be employed.

In a few isolated instances, some metal powders may be compressed under pressures as low as 10,000 psi. More common pressures used for coppers and bronze, range from 40,000 to 60,000 psi. and it is general practice to compact iron and steel powders at from 60,000 to 100,000 psi. Higher pressures have been employed and the tendency to-day, is to use higher and higher pressures.

Mr. Balke, of Fansteel Metallurgical Corporation, used pressures as high as 160 tons psi. for experimental work and achieved results of such an order of magnitude that even with present equipment, unusual circumstances may justify using such high pressures.

After the powder has been compressed, we have what is known as a green compact or green briquette. This green product is strong enough to be handled without deformation and without any special precaution, but it has few of the physical properties demanded of metal products. Therefore, it is usual to heat-treat this green compact. The temperature used depends primarily on the metal being treated. Commercial bronze powders are heated to around 1500° F., iron to 1900° F., steels to 2300° F. Exceptional products may require heating as high as 2600° F, while briquettes to be employed in catalytic chambers may not have to be heated at all.

What then is accomplished by taking a piece of metal, reducing it to very fine particles, and then squeezing the particles together again and sintering them? (I use the term "sinter,"

here, to distinguish from fusion, since sinter temperatures never are high enough to melt the metal). Quite a number of things may be accomplished:

1. We can produce solid ingots from metals so diverse in melting point that they could not be combined by conventional methods.

2. We are able to produce a solid metal from a material of such high melting point that no conventional furnaces are available for commercial production.

3. We can produce products of precise dimensions from materials so brittle or so hard that machining to the close tolerances required is either extremely difficult, or impossible.

4. We are able to produce products having physical properties completely unobtainable by other methods.

5. We can make laminated structures, with layers of several different metals combined together, more intimately and successfully than by conventional methods.

6. Finally, we can produce parts to very close tolerances, with unskilled labor and at a very rapid rate of production.

Let us then consider these advantages, in order:

First: The combination of two materials which can not be alloyed by fusion: It is interesting to note in this connection, that with powder metallurgy mixing two such materials may produce a well known alloy, an alloy previously unknown, or a pseudo-alloy which is more properly an extremely intimate mixture and which retains most of the properties of the two or more metals combined by this technique. The method follows the basic principle of compressing a powder in a die, but in this case the two or more metals are first mixed together in the desired proportion, and the mixture is compressed.

When copper and tin powder is mixed, pressed, and sintered, the product is a conventional bronze with all the properties of a bronze of similar composition.

The best example of the pseudo-alloy, is probably the contact points which, are made to-day of tungsten and copper, or tungsten and silver. Here, the resistance of tungsten to pitting and its high melting point is taken advantage of to increase the life of the contact, while the high conductivity of the copper or silver is employed for its current-carrying properties. An ordinary copper contact in an oil circuit-breaker fails after 25,000 cycles. A tungsten-copper contact is good for 150,000 cycles.

Second: Production of metals which can not be melted in a conventional furnace. The most common example of this, is tungsten, and it is probably the earliest example of the powder metallurgy technique on a commercial scale. The high melting point of tungsten makes it a splendid material for use in lamp filament, but

unfortunately, no ductile tungsten could be produced and probably little metallic tungsten could ever have become commercially available, had not this technique been developed.

There just was not heat resistant material available which could be operated for any period of time at 3370° C., in other words, above 6000° F., in which to melt the tungsten or of which to make the furnace. But by compressing tungsten powder, which could be made by reduction, a metal ingot was formed at about two-thirds of the melting point.

It is important to note here, that though the tensile strength of such tungsten is greater than that of any other metal, (in the neighborhood of 590,000 psi.), this material has never been fused and perhaps this will answer one of the questions which always arise in the minds of those encountering this subject for the first time, "How strong can you make a part from metal powders?". It is necessary that you divest yourself of the idea that in order to get strength, you have to have a metal which has been melted.

Third: Advantage. We can produce parts to close tolerances from extremely hard or brittle materials. The best known example of this is, perhaps, the carbide tools. The advantages of tungsten, titanium, and other carbide tools, are obvious. The carbide tool-tips will machine metal at the rate of 600 feet per minute, or about thirty times as fast as high-speed steel. A solid bar of these carbides in their final form is too hard to machine by any known means. It can only be ground and shaped with such abrasives as diamond dust.

By using the powder metallurgy technique, it is possible to mix tungsten-carbide with from 3 to 13 per cent of nickel or cobalt, and then to compress the mixture in a die. If the green compact is now sintered at a relatively low temperature, the semi-finished ingot is sufficiently strong to machine and sufficiently soft to cut easily, so that at this stage it can be shaped to the tool bit dimensions required.

As a matter of practice, it is cut considerably oversize, since in the final stage of sintering there may be a shrinkage of as much as 30 per cent, and the changes in dimension must be allowed for. By this process we have made available an extremely hard cutting tool which could not be machined from a solid bar.

I spoke also of brittleness. The permanent magnet, with which you are all familiar, under the trade name of the "Alnico Magnet," may be made either by casting or powder metallurgy. This product is so brittle that it is extremely difficult to machine. Cutting small magnets from a large bar is very difficult. All of the small units are made by compressing the mixed powders in a die, which gives them the final shape they assume after

sintering.

As a matter of fact, these units made by the powder metallurgy technique, have a finer grain structure than the more coarsely grained cast material so that they have a greater strength and are more free of internal polarity.

Fourth: We make materials with unique final characteristics. The outstanding example of this is the porous bearing. Naturally, any conventional fusion would not produce a porous unit and the self-lubricating bearing would be impossible. For a great many years, by employing the powder metallurgy technique, bearings have been produced containing from 0.25 per cent to 40 per cent of voids, and the percentage of porsity can be very closely controlled. Such bearings are frequently called oilless bearings, because when they are made the pores are filled with oil which is retained by capillary action, and yields enough lubrication for the life of the equipment.

A true oilless bearing is more properly the bearing which is made of graphite-bearing bronze. Here the graphite is intimately mixed with the proper proportions of tin and copper, or with the proper proportion of bronze powder, compressed and sintered. The product is made in a die to give it its final shape, so that it needs no further machining to produce a sleeve or other bearing unit. The graphite, of course, acts as a lubricant and as the bearing wears, always presents a graphited face to the moving part.

Fifth: We stated that we could laminate several metals together. This is best illustrated by the brake linings, or clutch faces, which in many cases have replaced non-metallic linings. In others it is hard to believe that any but this newer type of brake lining could withstand the terrific use to which they are subjected. For instance, those employed for aeroplane brakes. It is said an aeroplane landing at 100 miles per hour, produces at the surface of the brake, a temperature of 1200° F., in less than 8 seconds. The backing of these bearings is a steel of satisfactory strength. The face of the bearing is a special iron or bronze mixture which is made of powder and is compressed against the steel backing under fairly high temperatures.

It may interest you to know that the clutch faces which turn the turrets of American tanks on the battlefield, are all made by means of the powder metallurgy technique and that practically all aeroplane brakes are faced by a material employing metal powder in their manufacture.

Sixth: Parts commercially machined, may be made quicker with unskilled labor, and in many cases, better than the skilled labor can produce them. The other points we have made apply to special products and meet with little competition from conven-

tional machining methods, since in most cases, no conventional methods could duplicate them, but when we come to a part which is commonly machined, there must be extraordinary advantages in this method, if it is to supplant the older ones.

Many machined products cannot be duplicated by the powder metallurgy techniques. There are very definite limitations as to size and shape of the parts that can be more economically made by powder metallurgy than by the several other methods of manufacturing parts. We must necessarily compete with casting for all metals that can be successfully cast, but of course, a casting has not the physical characteristics which may be obtained by powder metallurgy, and on a die casting the tolerances are very much grosser.

Labor charges are usually cheaper than for forging and stamping, and there is less waste of material than with screw machine fabrication, and the rate of production is as high as by casting or screw machine fabrication. With the powder metallurgy technique, although the cost of the raw material is extremely high as compared with bar stock, there is practically no waste. However, it is not these overall factors which are the most vital consideration to powder metallurgy.

More important is the design of the piece that must be made. It is important to keep these limitations within the designer's ken, for if the design is right, it is usually very much cheaper to make a part by this technique than to machine one, and the engineer who is aware of these limitations can often just as readily design a part which can be made cheaply by this newer process. It will serve his purpose just as well as a more costly machined part.

Sharp corners are very difficult to produce if close tolerances are required. In general, we can count on a tolerance of .002, though if desired, and the price is justified, tolerances closer than .0005 are attainable and parts have been made in quantity, with these close tolerances.

If we are to make a part by a single pressing operation or a series of pressing operations, then narrow and deep splines are to be avoided. Powder will not flow as liquid, nor will the transmitted pressures obey hydrostatic laws.

Although many parts have been made with great variation in cross-sections, and presses are being designed to compensate for sharp differences in cross-sections, these still present a problem which should be avoided if the design will permit. Reentrant angles, under-cuts, or cross holes, cannot be formed in the die and if a part is to be made by powder metallurgy embodying such a design, it will require a machine operation to finish the part; to make the under-cut or drill the hole.

The length of a part should bear

IN April 1876, thirty-five chemists met in NewYork City with the purpose of forming an American chemical society. From that beginning has grown the world's largest organization devoted to the science of chemistry—the American Chemical Society, with a membership of approximately 38,000.

Thirty-five years ago, in 1909, the American Chemical Society opened its ranks to corporate members. From the small group of eight firms which joined that year—and Merck was among the first—the corporate membership has grown to approximately 600, proof of the chemical industry's wholehearted support of ACS principles.

Merck & Co., Inc., on the 35th anniversary of its membership, is glad to pay tribute to the part the American Chemical Society is playing in the building and maintenance of a strong chemical industry, and to join the North Jersey Section in welcoming to New York the 108th National Meeting of the Society.

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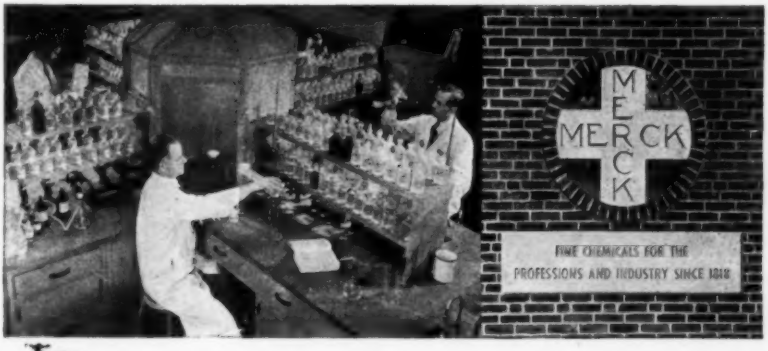

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some reasonable relation to its area. In general, 3 to 1 is a maximum ratio. Although I have recently made parts of a ratio of 6 to 1, special equipment was employed, and such ratios cannot yet be recommended for successful production schedules.

In spite of these limitations there are thousands of parts being made by this method, some of which are extremely intricate in shape. The size of parts is limited only by the size of the equipment which it is economical to use. If steel pieces are being made, they must be pressed in the neighborhood of 50 tons to the square inch. Therefore, a 300-ton press would be capable of making parts only 6 sq. in. in cross-section area.

It is sometimes profitable to employ such presses and indeed, at the New York meeting in February, Mr. Langhammer of the Chrysler Corporation, said his company was making parts 18″ in diameter and were planning to make them as large as 36″, so that although the great majority of parts being made at present, weigh only a few ounces, it has already been proved commercially feasible, under certain circumstances, to make very large units. Theoretically, there is no limitation as to size except such limitations which may arise from the economies involved.

In general, it is much easier to tool up to produce powder metallurgy parts than machined parts, and it is not unusual to get production into full swing six weeks after the design of the part has been completed. Compare this with perhaps six to eleven months for tool-up time for conventional machining.

As to the rate of production, it is quite common to produce fairly large parts at the rate of 500 to 1,000 an hour and many smaller parts are produced at the rate of 12,000 per hour, on one press. Hardy, as far back as 1942, which is a long time as we measure developments in powder metallurgy, reported production rates of as high as 240,000 per hour.

There is also no limitation to the strength of a part which can be produced by this method, except such limitation as is inherent in the metal no matter how it is formed. It is quite customary to produce parts for mechanical application, with 90 per cent of the density and tensile strength of those machined from bar stock. A part which has not been subjected to any sintering, but merely pressed in a die under sufficient pressure may have strength enough for the purpose for which it is to be employed.

I say there is no limitation, but again economics may be the limiting factor. I know of no one employing pressures for commercial purposes of 160 tons per square inch, but Balke did use such pressures for laboratory experiments, even before 1943, and his company, Fansteel Metallurgical Corporation, may be using them in

their production cycle today. I am inclined to think that for the time being, such pressures are practical only for small parts.

However, I would not want you to get the idea that high pressures are not available. The Hydraulic Press Manufacturing Company has built a great many presses as large as 5,000 tons and they recently placed in the powder metallurgy field a 1,500-ton press. With such a press available, parts 9½" in cross-section could be pressed 160 tons per square inch and would probably have properties superior to steel of similar composition.

Aluminum pressed at 25,000 lbs,, a mere 12½ tons per square inch, has a tensile strength before sintering of as high as 25 per cent of an ingot bar. After sintering, such a lightly pressed aluminum will have physical characteristics comparable to those of bar stock.

When Balke used 160 tons he hoped to make parts not equal to, but superior to those made from bar stock, and he reasoned that if tungsten which had never been melted, or tantalum which had never been subjected to previous heat, had the remarkable physical properties they possess, why should not iron or steel units made by this technique be superior to those made by the conventional methods. He found that when he pressed iron powder at 160 tons, he achieved densities of 7.83 (standard steel is 7.75, wrought iron 7.70) before sintering, and hardness on the "B" scale of the Rockwell tester, of 86.

The tensile strengtn of these pressed products was about 9,000 lbs., which, after sintering, went beyond 55,000 lbs. psi., and this compares with ingot iron, ingot nickel, wrought iron, or regular wrought iron, which have tensile strengths ranging from 42,000 to 58,000 lbs. Armco ingot iron may give from 41,000 to 45,000 lbs. ,and only nickel wrought iron of very high quality exceeds, by a small percentage, the tensile strength of iron products made by powder metallurgy.

Not content with this demonstration, Balke proceeded to compare a manganese molybdenum steel powder with standard manganese molybenum stock. Although his density was 7.82 compared to a standard of 7.84, his tensile strength exceeded standard by about 25 per cent, the hardness of the annealed stock was about 30 per cent greater, and that of the quenched and tempered the same, while the modulus of rupture was 50 per cent greater than that of standard. The powder metallurgy product had a tensile sterngth of 124,000 psi., and the modulus of rupture was 603,000 psi.

The evidence regarding strength of the powder metallurgy products may be mutiplied by examples from many sources, and this will answer the question—"How strong can I make a product by this method?" The an-

swer is, that you can make it as strong as the part justifies.

The common practice is, in general, that products are made under pressures of less than 100,000 lbs. and have physical properties of 85 per cent to 90 per cent of the same product had it been machined. But we are going to have to find new criteria for evaluating powder metallurgy products. Strength per se, is meaningless.

One of the first parts made in very great quantities was the gear for driving the fuel pump, which was made, by this method, by all of the leading automobile manufacturers during the last few years before the war. The actual strength of this gear was considerably below the strength of a machined gear and no effort was made to make it stronger for the simple reason that it would outwear the machined gear, and in fact, I have heard manufacturers say, it outlasted all the rest of the automobile. Whether this is due to the fact that gears made by this method conform more closely to the theoretically perfect design and that they could be held within closer tolerances than by machining, or whether it was due to the slight porosity which made for better lubrication, or whether it was due to the more silent operation, producing less chatter, is very hard to say. But although all methods commonly used for evaluating the strength of a metal would have marked this an inferior product, the most important test of all, the use test, showed it to be a superior one.

We have now taken up the subject of strength and production rates. What about skill? To attempt to evaluate this, let us turn back to the process. In practice it is necessary to mix a powder and feed it into a hopper and to see that this hopper is continually full. Beyond this, once the press is adjusted and the die in place, the press operator has little to do but to keep his platens clear and load the products of the die into the furnace.

In its simplest form, when the material leaves the furnace and is cool, it is ready for packing. In a more complicated process, it may be necessary to repress in a sizing die and resinter again, or, in exceptional cases, a number of times.

Once a proper cycle has been set up by an experienced powder metallurgist, its operation can be left in the hands of a completely unskilled workman.

Against these many advantages, we have but two serious limitations. First, shape and size of parts; and second, cost and supply of powder. The designer in many cases can reduce the problem of shape, the press manufacturer can remove the problem of size. As to cost of powder: Iron and steel powders, and we may as well speak of these powders since they are rapidly exceeding the use of copper and bronze powders, vary

enormously in quality and price. A low priced powder of the type similar to Swedish sponge iron is the most plentiful and may be used for very many purposes.

The higher priced powders are scarce and their price, at least in large measures, reflects the supply. As more of this class of material is produced, its price will drop sharply. A great many firms are seriously interested in making these high grade powders and quite a number of them have now passed the pilot stage and are in the "small scale" production stage of operation.

The cost of powder varies from pre-war Swedish sponge at about 10 cents per pound to a comparable powder, but a superior one, made in America, at about 17 cents per pound. High grade reduced or electrolytic powders cost from 60 cents to $1.00 per pound, and steel powders cost about 50 cents per pound. You may have heard of powder at $1.10 and $3.00 per pound, but these prices are brought for carbonyl iron only. These powders never will be materially cheaper and for the manufacture of mechanical parts, offer no advantages over the steels or high-priced irons. They are used largely for radar and radio parts.

In spite of the high prices of the raw material, the use of the powder metallurgy technique offers such advantages in saving of material, saving in skilled labor, production of parts to close tolerances, and enormous rates of production, that it continues to be an expanding industry. For my part, I consider it an extremely healthy infant, having reached a state of development comparable to that reached in the plastic field some twenty years ago, and I predict for it a future as prosperous and as important as that which plastics have reached today.

Dow Asks Freedom for Magnesium Industry

Willard H. Dow, president of the Dow Chemical Company, has asked the War Production Board to remove controls over magnesium and its alloys at once to prevent the possible destruction of a vast potential industry.

According to Dr. Dow, the magnesium industry is now capable of supplying all possible needs of the government, either for domestic use or export. A stockpile of approximately 100,000,000 pounds will insure against any kind of shortage, and therefore there no longer exists any reason to keep the magnesium industry under any form of control or allocation.

In 1941 the Dow Company was producing magnesium rated in excess of 600,000,000 pounds a year but, recently the W.P.B. cut back production to 300,000,000 pounds a year,

mainly for reasons of manpower consideration.

Dr. Dow charges that W.P.B. order M-2-b, issued July 15th, has been represented to the public as removing controls over magnesium, while not actually doing so, although it modifies certain controls.

In a letter to Donald Nelson, Dr. Dow recommended that the W.P.B. remove all controls from the magnesium industry now and permit it to function as a private industry. "If the industry now had the opportunity, it could go ahead developing markets for peace-time consumption and . . . develop opportunities for providing employment."

"Every day that the Government now delays in freeing the industry means a greater delay later on in providing employment."

New Curriculum at Brooklyn Polytechnic

Dr. H. S. Rogers, president of the Polytechnic Institute of Brooklyn, announces the introduction of a new curriculum at Polytechnic to meet the needs of post war education.

Under the new plan, the curriculum is divided into basic, intermediate, and advanced courses, with a re-alignment to make each level an entity in itself, instead of staggering different phases through four years with different terminal points. Sud-divisions will not be chosen until the student reaches the intermediate level.

This enables the pre-draft age student to complete basic work before entering the armed services. On his return he can then pick up the intermediate work in the sub-division of his choice.

Harper Honored by Chicago Chapter A.I.C.

Dr. R. B. Harper, F.A.I.C., vice president of the Peoples Gas, Light and Coke Company, Chicago has been selected by the Chicago Chapter of the AMERICAN INSTITUTE OF CHEMISTS, to be honored at the Chapter's annual testimonial dinner.

The Dinner will be held at the Morrison Hotel, Chicago, October sixth, at 6:30 o'clock. Mr. G. F. Mitchell, president of the Peoples Gas, Light and Coke Company, will be one of the speakers.

Chemists living or visiting in the Chicago area are cordially invited to join with the Chicago Chapter in honoring Dr. Harper. Reservations may be made with Dr. C. L. Thomas, Universal Oil Products Company, Riverside, Illinois.

H. A. Endres, F.A.I.C., of the Goodyear Tire and Rubber Company, spoke on "Derivatives of Synthetic Rubber," before the recent Canadian Chemical Conference held in Toronto, Canada.

Sugar in the Diet of Man

C. Jelleff Carr

Associate Professor of Pharmacology
School of Medicine, University of Maryland

THE present period of our knowledge of carbohydrate metabolism is characterized by an increased emphasis on new tools, new methods of study, new theories to explain long-known facts rather than startling new discoveries.

Application of the radioactive isotopes and new syntheses of organic compounds are evidence of the ingenuity of man in attempting a solution of the problems of carbohydrate breakdown in the animal body. In the past twenty years a great deal has been learned but still the mechanism of conversion of carbohydrate food to muscle energy eludes our complete understanding.

Why Do We Eat Sugar?

Although known to man for two thousand years, sugar was a table luxury two hundred years ago. To the general population then it was familiar mainly as a medicine. Today the average American consumes over a hundred pounds of sugar every twelve months. Why do we eat sugar? Is it a body necessity like salt? The answer is simply that there is no bodily requirement for sucrose other than that it is a good source of energy and tastes sweet. An educated palate, trained from childhood to accept sweet tasting food, accepts readily a diet rich in sugar.

Whether sucrose is the best form of sugar for human consumption is open to question. That it is a good source of energy and capable of giving rich stores of glycogen in the liver is well understood. But while polysaccharides and disaccharides constitute a large proportion of the carbohydrate food of man, their use in the body depends upon their conversion to simpler forms and final metabolism as glucose.

Chemical Configuration and Metabolism

There are sixteen theoretically possible organic compounds having the general formula $C_6H_{12}O_6$, if one accepts the customary aliphatic carbon-to-carbon linkage. They are glucose, mannose, gulose, idose, galactose, allose, altrose and talose. Unfortunately, because most of the isomers are museum curiosities, they have been studied very little from the standpoint of metabolism in the animal organism.

At first glance, one would suspect that there would be no difference in the manner in which these isomers would burn in the body.

Experiments have shown that this is not the case. With the isomer, galactose, after administration by mouth, the concentration in the blood increases and the blood sugar increases, but this sugar is metabolized more slowly than glucose. Insulin is necessary for its combustion, for in diabetics it is valueless as a source of carbohydrate. On the other hand, galactose is absorbed more quickly than glucose from the intestinal tract. Mannose, the only other isomer that has been studied, behaves in a similar manner.

The corresponding sugar alcohols and their anhydrides of these isomeric sugars have been studied in recent years. These compounds have been shown to behave in an irregular manner similar to the aldehydes. Sorbitol has been studied in experimental animals and in man as an available carbohydrate that may require less insulin for metabolism.

This sugar alcohol is sweet-tasting and therefore will satisfy the longing of the diabetic for sweet food. European investigators have reported that this compound may be added to the diabetic diet without adding extra insulin. Workers in this country have demonstrated that the metabolism of sorbitol in the normal adult differs from that of the diabetic. In normal humans, sorbitol increased the respiratory quotient above the normal level to an amount similar to an equal quantity of dextrose. The blood sugar curve remained practically normal after sorbitol.

In diabetic subjects, sorbitol failed to influence significantly either the blood-sugar level or the respiratory quotient. It is suggested that in the liver sorbitol is converted to levulose and then polymerized to glycogen. Such a conversion prevents a plethora of glucose from appearing in the blood. The absence of a precipituous hyperglycemia from the regimen of the diabetic exerts a benign influence upon his carbohydrate tolerance.

These investigations are being pursued at the present time with the aim of eventually providing the diabetic with "free" carbohydrate that will not require extra insulin when added to his balanced diet.

Insulin and Diabetes

From a study of one and one-half million diabetics in the United States of whom forty per cent require insulin, we have learned a great deal concerning carbohydrate metabolism. Investigators do not believe that massive doses of a rich carbohydrate diet over long periods produce any inclination to diabetes. That the human body is capable of developing a tolerance for high carbohydrate diets, witness the rice diets of the Oriental and the well known fact that diabetes is practically unknown in their countries.

On the other hand, the disease is more common in our modern cities than in primitive rustic communities. Interesting enough, in this respect, the Eskimo, who lives on a high fat diet is incapable of tolerating large amounts of carbohydrate although he may develop a tolerance.

The process of glycogen formation (glycogenesis) in the liver resulting from the ingestion of carbohydrates has come under careful study in recent years. The synthesis and storage of glycogen in the liver are believed to be controlled by insulin but the underlying mechanism is obscure. We cannot state with certainty whether the effect of insulin is primarily to promote glycogen synthesis or to inhibit the reverse process of glycogenolysis. The actual conversion of liver glycogen is believed to be due to a diastatic enzyme designated as glycogenase.

Some investigators are of the opinion that when insulin is lacking, as in diabetes, the enzyme hydrolysis proceeds unchecked. This view holds that a continuous supply of insulin by the pancreas is essential to preserve liver glycogen. Opposing this inhibition of glycogenolysis is epinephrine tending to mobolize hepatic glycogen and raise the blood sugar concentration.

Muscle glycogen, on the other hand, is formed principally from blood glucose. Less is known of the role of insulin in glycogen metabolism of muscle. The great difference between the breakdown of muscle glycogen and liver glycogen lies in the character of the hydrolytic products.

Whereas liver glycogen yields glucose, glycogen breakdown in muscle gives rise to lactic acid, and the energy of muscle work is made available. The lactic acid formed during muscular activity is disposed of in three ways. Part is oxidized to CO_2 and H_2O, a part is resynthesized to glycogen in muscle, and a part diffuses into the blood and is eventually utilized to form glycogen in the liver. An ingenius experiment recently conducted throws some light on this problem.

Fasting rats were fed sodium lactate and given an intravenous injection of radio-active bicarbonate (C"). The glycogen formed in the liver of these animals contained from 0.3 to one per cent of radio-active carbon derived from the bicarbonate while none was found to be present in the muscle glycogen. In this manner some of the problems of carbohydrate metabolism are being explained.

Substitutes for Sugar

The chemically unrelated sweetening agents such as saccharine are not acceptable in the diet. They have no dietary value as foods and are objectionable to many individuals. The chemically related sugars or sugar alcohols, however, might serve as substitute sweetening agents, in fact many of these compounds possess a sweet taste that is pleasant and quite unlike sucrose. Exception must be made to mannose, however, which is a bitter

sugar. Any such sugar to be used in the diet as a sweetening agent must be reasonably cheap and available in large amounts. Few compounds satisfy these two demands.

Levulose produced cheaply from artichoke tubers is a sugar that possesses many advantages. Its taste is sweet and in addition this sugar is well-tolerated by the body. Glucose, produced very cheaply from corn starch by hydrolysis, offers perhaps the most likely possibilities. Besides, being inexpensive this sugar is the natural sugar of the blood and is the sugar selected by nature as the energy transporter in the animal and vegetable kingdom.

Long looked upon by the food industry as a "filler" in cheap candy, glucose is now recognized as a source of readily available energy. Glucose as the syrup contains dextrins and other substances that prevent crystallization and hence is known in most households as table syrup. In recent years a pure powder form of glucose has been made available. Unfortunately glucose is not as sweet as sucrose, neither does it possess the fine crystallization properties of sucrose.

It is quite possible that new sugars may be synthesized in the near future. Such compounds made by organic chemical means in industrial quantities could change the dietary habits of man in a manner similar to that produced by sucrose. The metabolic background for such a synthesis has been painted; it seems quite likely that some day many of the details will be fitted to this picture.

Benjamin Levitt Enters Consulting Field

Benjamin Levitt, F.AI..C., 4834 North Franklin Street, Philadelphia, 20, Penna., has entered the consulting field, to which he brings thirty years of experience as a chemist in the soap industry with Procter and Gamble Manufacturing Company, Swift and Company, and recently as superintendent of Charles W. Young and Company, Philadelphia.

Hovey Appointed Executive in Charge

Almon G. Hovey, F.A.I.C., has been appointed executive in charge of the New Chemicals Development Section of General Mills' research laboratories. Mr. Hovey specializes in the field of synthetic resins. Previously he was in charge of the Patent and Coating Resin Divisions of Reichhold Chemicals, Inc. of Detroit, Michigan.

Chemistry at Jeffersonville Quartermaster Depot

By Captain E. C. Sibley and J. P. Urbanek

GLOBAL war-fare has imposed tremendous burdens on the Quartermaster Corps in the procurement, storage, and distribution of supplies to the Armed Forces. In the first World War the battle zone extended over an area in which the climate was similar to that of the United States. Equipment could be procured and produced with a certainty of knowledge as to where it would be used.

But in the present conflict, waged as it is on scores of fronts, scattered over the length and breadth of the globe, the conditions under which our armies are called upon to fight vary from the Arctic to the tropic jungle.

The historic Jeffersonville Quartermaster Depot, charged with the responsibility for the procurement of over 20,000 articles of supply and the preparation of specifications of the majority of them, faced early in the war the need for an efficiently organized unit to conduct work in research, development, testing, and the preparation of specifications to be used under the vitally varying conditions of the present war.

Accordingly, the present Engineering Division was established at the Jeffersonville Quartermaster Depot early in 1941. This unit has given to the Depot the unique distinction of being the only Quartermaster installation in the country, and probably in the world, charged with the four-fold mission of procurement, manufacturing, scientific research, and development, and the general storage and issue of supplies to America's Armed Forces.

Housed in a modern, well-designed permanent building containing testing laboratories, offices, drafting rooms and equipment for blue printing, photostating, and multilithing, the Division is called upon for a variety of vital functions, including the physical and chemical testing of many types of material, research and development work, and the preparation of specifications, drawings and bills of materials.

Creation, adaption, substitution and research, are the media through which new materials and designs are given the breath of life at Jeffersonville. To nurture this progressive development by constant advancement over its problems is the function of the laboratory

and its staff, to whom a thousand problems come for solution: What's it made of? How does it work? Will it stand up? Why did it fail? Will it fill the bill? What can be substituted?

In this extensive and ambitious program, chemistry plays an important role at Jeffersonville. One large section is concerned with chemical analysis; another, with research and development studies in the prosecution of which many branches of chemical, physical and engineering science are invoked.

Within these laboratories the war has brought together a professional group exhibiting a discipline of thought and versatility in experimentation concomitant with its collective years of study and experience. These men and women today are dedicating their energies and abilities to the solution of many of the technical problems arising out of the determination of the Quartermaster Corps to supply our troops with the finest equipment in the world.

The great variety of equipment items and materials handled by the Depot demands a corresponding diversity of technical skill and knowledge. Textiles must be analyzed for dye type, pigments, resins, water repellents and mildewcides; plastics and synthetic rubbers are identified, and their resistance to a multitude of chemical and physical conditions studied; paints, lacquers and wood sealers are tested for composition, and their protective functions evaluated in the light of the extremes of climate imposed upon equipment by world-wide war; metal utensils and mess gear receive constant attention for composition, durability of plating, and functional quality; leather used in saddles, dispatch cases, map cases, straps, and harness must be properly tanned, curried and finished. Insect repellents, field bake ovens, cork products, mobile laundries, marking inks, intrenching shovels, goggles, pack-boards and can openers are but a few of the many other articles and materials tested and studied.

The conduct of these activities is implemented by one of the best equipped laboratories in this part of the country. Apparatus available permits the application of advanced chemical and physical methods including spectrography, spectrophotometry, polarography, electrometric analysis, metallography and microchemistry.

The War Department has assigned an important task to the chemists at Jeffersonville. Answers to the many questions and problems to which they address themselves today are helping to maintain the superiority of equipment used by our troops wherever they engage the enemy, to the end that the day of victory for the Allies may be quickened.

Post-War Chemical Education

Martin Meyer, F.A.I.C.

Brooklyn College

CRITICAL evaluation of American educational achievements and processes has been increasing in volume for several years. Social, commercial, and political organizations, national and local committees, individuals, educators and others, have recorded their opinions where he who runs may read, and the reading has been done at high speed. The general conclusions appear very unfavorable to the *ancien regime*.

It is accepted by many that people from whom better might be expected cannot satisfactorily spell, read, speak, or write business letters, and are not adequately trained in mathematics, in physical sciences, in languages; that specialized training takes too long, that it contains too much cultural information, or not enough; that education does not sufficiently emphasize and inculcate ethical and social values, or train for the democratic way of life.

To thoughtful educators, particularly those of scientific bent, this is becoming confusing, among other reasons because some curious contradictions are presented. One purpose of all education is perhaps to enable one to make reliable critical evaluations. Since the severest critics are products of the system of which they disapprove, yet they assume, by inference, that they are competent to form their opinions. Their existence in large and confident numbers might argue that the system they assail had its merits, which one could not conclude from their remarks.

Unfortunately however, their existence is frequently a more severe criticism than their assertions, for one is at once struck by the absence of data and the vagueness and questionable validity of such specifically constructive statements as are made.

Thus, is it fair to assume that a high school or college education is the proper training for many business careers? Is there an obligation upon an employer to examine more closely than is usual, the relationship between the requirements of his work and the training of an applicant?

Why should just any high school or college graduate be expected to have exactly the variety of mathematical or scientific training which may be re-

quired for a specialized task, however important at the present time? Why should the graduate, per se, expect to enter business at an advantage over his ungowned fellows? Then, what efforts have been made to determine that adequately trained people are already in existence, and to utilize them for such purposes?

While there is no adequate data to answer many similar questions, most educators have made personal observations which bear upon them, and often conclude that the answers are different from the usual ones, or else that their experiences are exceptional. While frantic efforts have been made to educate technical people for the war requirements, and literally hundreds of thousands have been hastily exposed to abbreviated courses of all kinds, the writer has not yet met a chemist outside "official" society circles who was offered a position in essential war work.

On the other hand he knows many who have been unable to find such work despite strenuous efforts, and many more in the military services whose duties have no relation to their training. One outstanding young Ph.D. in chemistry gave his life for his country as an infantry officer early in the war because he was an R.O.T.C. officer and too patriotic to point out that he might have been more valuable somewhere else.

Yet another graduate writes, "I teach the theory and construction of (radio) receivers. I was in the arts division at college with a major in speech, yet I find myself doing work which is definitely in the sciences."

The chemists with postgraduate training become meteorologists, physics majors with meteorological training and mathematicians become infantry privates. Much criticism of education seems to stem chiefly from the desire to have everybody trained for everything, so that those whose duty is to organize do not have to give any thought to placing the square peg in the square hole. That is impossible even if it were desirable.

The scientifically minded, having painfully acquired a method of reasoning in which they have confidence and wrongly supposing that the age of belief in magic is past, are inclined to view these educational fulminations rather casually, if they have the patience to follow their high sounding ambiguities at all. But the proponents of change speak with eloquence and appealing conviction to an uncertain and frustrated world, which losing its goals now even distrusts its methods.

The critics having learned the art of speaking and writing with an appearance of wisdom on all subjects, now propose to teach it to students.

Despite the quality of their reasons, it seems safe to predict that they will influence education, even scientific education. Part of the technique of science is being used to play upon the

primitive emotions which always lie just below the surface.

As a first definite conclusion, educational processes will change. We must prepare for it, or the entire course of the change will be of as uncertain validity as the reasons. The tide which is flowing is very strong, we must swim with it or uselessly spend strength and the small store of capital which have been so difficult to accumulate.

The vortex of debate seems to center with special strength about liberal education at the college level. As this is intimately related to the principal basic training in chemistry, this is an issue in which the chemist has a stake.

A recent volume (Van Doren "Liberal Education") summarizes excellently what appear to be the outstanding current trends. After 148 pages of conventional and impeccable scholarly verbiage irrefragably related to liberal education and composed with sufficient art not to discourage the lay reader, the writer descends at the climactic moment from the Olympian heights of theory to enunciate his practical program for improvement.

He elaborates and endorses with some enthusiasm the St. John's College curriculum. Although this is a moderate suggestion in the sense that it proposes something which is being done, most of those who seem to agree with his point of view nevertheless seem unable to concur in it. Since they are all travelling in the same general direction, the curriculum is worth examining because it is at least concrete, one can see what it means, and it could be carried out, since it is being carried out.

This collegiate educational plan is an overstuffed edition of the Harvard Classics, The baccalaureate candidate has prepared for his graduation by reading 110 books of all ages from Homer, "Illiad and Odyssey" to Russell, "Principles of Mathematics" and Veblen and Young, "Projective Geometry." They are indisputably classic volumes and include the Bible and selections from Shakespeare but with some noteworthy omissions as well as inclusions. As the result of this program a student's training in science would consist of:

Astronomy

Aristarchus: "On the Sizes and Distances of the Sun and Moon." Ptolemy: "Mathematical Composition." Copernicus: "On the Revolution of the Speres." Kepler: "Epitome on Astronomy." Galileo: "Two New Sciences."

Biology

Harvey: "On the Motion of the Heart." Virchow: "Cellular Pathology." Darwin: "Origin of Species." Bernard: "Introduction to Experimental Medicine." Mendel: "Experiments in Plant Hybridization."

Chemistry

Boyle: "Sceptical Chymist." Lavoisier: "Treatise on Chemistry." Dalton: "A New System of Chemical Philosophy."

General Science

Hippocrates: "Ancient Medicine and Airs, Waters, and Places." Aristophanes: "Frogs, Clouds, Birds." Lucretius: "On the Nature of Things." Galen: "On the Natural Faculties." Leonardo: "Notebooks." Bacon: "Novum Organum." Descartes: "Discourse on Method." Vico: "Scienza Nuova." Poincare': Science and Hypothesis."

Mathematics

Euclid: "Elements." Appollonius: "Conics." Nicomachus: "Introduction to Arithmetic." Descartes: "Geometry." Lobachevski: "Theory of Parallels." Peacock: "Treatise on Algebra." Riemann: "Hypotheses of Geometry." Dedekind: "Essays on Numbers." Cantor: "Transfinite Numbers." Hilbert: "Foundations of Geometry." Russell: "Principles of Mathematics." Veblen and Young: "Projective Geometry."

Physics

Aristotle: "Physics." Gilbert: "On the Lodestone." Newton: "Principia Mathematica." Huygens: "Treatise on Light." Fourier: "Analytical Theory of Heat." Faraday: "Experimental Researches in Electricity." Maxwell: "Electricity and Magnetism." Joule: "Scientific Papers."

This is a long and impressive list, and certainly all are worth reading. But in a world which it has become trite to call scientific, it may be left to the representatives of the physical sciences to express their opinions of this as a basis for an understanding of the present status of science, as preparation for advanced study, or for research.

As chemists, it is difficult not to remark that chemistry, whose contribution to the modern world is outstanding, fares exceptionally badly. For this college graduate, chemical knowledge would be limited substantially to what we should now call general chemistry, and that nearly 150 years old!

Practically, this would be a serious matter, for nearly all of our chemists today receive their training as part of a liberal arts education as candidates for the bachelors' degree, and nearly half probably receive no more formal education. Where would chemists come from if liberal education were thus transformed?

It is not often that current critics of educational procedures express themselves as clearly. Van Doren has therefore rendered a service by bringing into sharp focus, by a specific example, the necessary and logical conclusions, implicit in the nebulously ambiguous rhetoric of other proponents of the new liberal education, which, like so much of the so-called new thought of recent years, is neither new nor liberal.

It is cataclysmically reactionary. It returns, not only in spirit but in letter to ancient classic education, substitutes once again dialectics of experimentation, and ignores even as comparatively ancient events as the renaissance and the growth of humanism. Reading an exposition of experimentation is not a substitute for experimentation. But it points the direction in which the current criticism is moving, and that is the direction we are moving.

What can chemists do about it? That is not easy to answer. One would like to see the critics start by defining some purposes of education. If, however, they said that education was a pious hope rather than a fulfillment of a program, one could not find too much fault, for it requires more than courage to assert that anyone can outline a program for the education of a youth which will remain equally valuable for the remainder of his life.

But it does seem possible to isolate a few specific objectives. Among those upon which some agreement might be obtained could perhaps be found: The preservation and dissemination of those ideas and ideals which the social group at present values; the teaching of skills which may be helpful in earning a livelihood; the formation of interests which may interestingly and usefully occupy future leisure time and thus make life rich and interesting; the creation of an understanding of the nature of the world in which one finds himself; the development of a philosophy of life which will make the process of living a reasonably happy one; the advancement of learning; and the improvement of the race.

While it is true that a program such as that outlined fulfills some of these objectives, if one were limited to such a choice he might be inclined to believe that four years of study of the *Encyclopedia Britannica* would yield a better return.

It is necessary however, to examine some of the urges behind this effort, that, by yielding to them, whether we agree or not, we may be able to relieve some of the pressure which will otherwise sweep everything before it. It has been said that science teaching is the only part of education upon which effort must be spent, because to learn science is labor of the perspiring and shirtsleeve variety, whereas the urge for self-expression is so strongly innate in all human beings that they will usually develop the rest for themselves.

Many today, observing the apparent material advantages of the possession of scientific knowledge, want the trade without the effort. Yield, therefore to the desire. There will be some disadvantages, but half a loaf is better than no bread.

Repetition at different levels has been an important part of chemical education. It has been effective and

has resulted in good understanding but it takes time. General chemistry, for example, is presented at the high school, college, and graduate levels.

Such courses might be revised so that there would be absolutely no repetition of subject matter, each course building upon and extending the previous one. It would involve very careful rearrangement of content. By suitable cuts in content, all courses such as organic, analytical, physical chemistry, etc., which are at present one year in length could similarly be reduced to a semester. A college student could thus get "basic" training in chemistry in two years.

Then there might be introduced at the college level, practical vocational courses such as paper, textiles, dyes, medicinals, etc., which would equip the college graduate directly for minor industrial employment. Some schools have done this for a long time. The proposal is directly opposed to the theories of the educational innovators, but it could probably be successfully introduced nevertheless, because it would bring one of the popular pressures into play against them.

Their principal strength lies in popular support which, whether they realize it or not, is in all probability largely based upon such elementary economic thinking.

These propositions can be developed into a practical and new chemical curriculum for colleges. Except upon the grounds given no brief is held for it. It is proposed because a thoughtful evaluation of the present indicates it is necessary rather than desirable.

Likely it will produce chemists who know less than in the past and that less, less well, but they will at worst know something, and probably more than they will learn of the present world under some of the regimens they seem destined to have to endure if chemists do not play some part in the process and such changes are not made.

The proposed changes are not devoid of all merit. It may well be that in the careful revision of courses to reduce topical content, permanently valuable economies may be made. Very excellent shorter textbooks in many fields are already beginning to appear on the market. Many things are included now in chemistry courses because they were practically important in times long past. In the long run, the result would more probably be substitution rather than omission for our science grows apace, but the process would be expedited.

To anyone familiar with the history of our science during the last two centuries it is, however, clear that fundamentally such changes will represent a loss. One can only hope that will be generally perceived not too remotely. It is difficult to believe that any pressure can be greater than that of economic competition in "normal" times, and if it were possible to train better chemists or scien-

tists in much less time than we have been requiring, it seems doubtful that it would be necessary for these articulate but scientifically juvenile critics to point it out at this late date.

It is not new to discover that scientific education in general in recent years has produced individuals who were better trained than the minimum needs of their early positions. That has been its purpose. If education ceases to do that two important consequences will inevitably follow.

Individuals will sacrifice their chances for advancement and condemn themselves to lives of small routines, and society will sacrifice the scientific progress which has created much of the material wealth of our present world which supports, among other things, the educational process which is in dispute. The man who knows no more than his job will never do any more than his job, individually or collectively.

Necrology

William H. Butler

William H. Butler, research chemist in the Development Laboratories of the Bakelite Corporation, Bloomfield, New Jersey, and well known in paint, varnish and plastics circles, died March 26, 1944, at the age of forty-four, at his home in Bloomfield, New Jersey.

Mr. Butler was born in Meriden, Connecticut, the son of Otis and Hattie Butler. He is survived by his wife, Mrs. Mary Hickey Butler, and a son, Allen M. Butler; also, by a brother, Captain Samuel Butler of the U. S. Army stationed at Camp Hood, Texas, and a sister, Mrs. Lillian Langston.

Mr. Butler was graduated from Pratt Institute, Brooklyn, where he was president of the class of 1926. The following year he received the Pratt Institute Alumni Gold Medal. He was elected a Fellow of THE AMERICAN INSTITUTE OF CHEMISTS in 1935 and is also a member of the American Chemical Society. He was the author of many articles on protective coatings and a contributor to Mattiello on "Protective and Decorative Coatings." He was also active in the work of the Technical Committee of the New York Paint and Varnish Production Club.

William Mason Grosvenor

Dr. William Mason Grosvenor, president of the Grosvenor Research Laboratories, died at Park East Hospital, New York, N. Y. on Wednesday, May 31st. He was seventy years old.

Born in St. Louis, Missouri, Dr. Grosvenor was graduated from Brook-

lyn Polytechnic Institute in 1893, later attended Johns Hopkins University in Baltimore, and received the Ph.D. degree from the University of Pennsylvania in 1896.

During the First World War he introduced the use of mohair to replace silk in powder bags, and was a member of the Textile Committee of the Council of National Defense. Dr. Grosvenor was the first to introduce high-speed motion pictures for the study of rapid motion in industrial work in 1918. He also supervised the construction of the first contact sulphuric acid plant in the United States in Buffalo in 1905, a process he introduced into America from Germany.

Dr. Grosvenor was recognized as one of the country's experts on patents dealing with chemical processes. He represented companies at more than one hundred hearings in the Federal courts in patent litigations. Dr. Grosvenor held patents on processes he developed for refining magnesium and sulphuric acid and also invented various compounds to hasten the drying of lacquers.

He became a Fellow of THE AMERICAN INSTITUTE OF CHEMISTS in 1926.

Hiram J. Halle

Hiram J. Halle, president of Universal Oil Products Company, died in New York on May 30th at the age of seventy-seven.

A native of Cleveland, Mr. Halle was associated with the oil industry since 1914, and helped develop the process of "cracking" petroleum to produce gasoline. He began the manufacture of the Diesel engine in the United States about forty years ago, and contributed to the development of high-octane gasoline.

Mr. Halle was well-known for his philanthropies, particularly in helping to establish the New School for Social Research.

Arie R. Norton

Arie R. Norton, F.A.I.C., head of the standards laboratory at the Calco chemical Division, American Cyanamid Company, Bound Brook, New Jersey, died recently at Murray Hill Hospital, New York City, after suffering a stroke. He was fifty-eight years of age.

A native of Pueblo, Colorado, Dr. Norton was graduated from Colorado College and took post-graduate courses at Columbia University. He served as a lieutenant in the U. S. Army Chemical Warfare Service overseas during World War I. Previous to becoming associated with Calco more than twenty five years ago, he was affiliated with the Charles Pfizer Company, Brooklyn, N. Y. He became a member of THE AMERICAN INSTITUTE OF CHEMISTS in 1925.

COUNCIL

OFFICERS

President, Gustav Egloff
Vice-president, Donald Price
Secretary, Howard S. Neiman
Treasurer, Frederick A. Hessel

COUNCILORS

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Frank G. Breyer
Stuart R. Brinkley
Harry L. Fisher
Donald B. Keyes
Raymond E. Kirk
Frank O. Lundstrom
Robert J. Moore
Foster D. Snell
W. D. Turner

CHAPTER REPRESENTATIVES

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A. W. Burwell

Philadelphia
J. M. McIlvain

Washington
T. H. Tremearne

Chicago
Gene Abson

Miami Valley
Harvey G. Kittredge

Baltimore
Maurice Siegel

Louisiana
Harold A. Levey

June Meeting

A MEETING of the National Council of The American Institute of Chemists was held on Tuesday, June 27, 1944, from 6:30 p. m. to 11:00 p. m., at The Chemists' Club, 52 East 41st Street, New York, N. Y., with president Gustav Egloff presiding.

The following officers and councilors were present: Messrs. G. Egloff, F. A. Hessel, W. H. Hill, R. E. Kirk, J. M. McIlvain, R. J. Moore, H. S. Neiman, D. Price, A. Lloyd Taylor, and J. H. Yoe. Dr. E. L. Luaces, T. S. McCarthy and Miss V. F. Kimball were present.

The minutes of the previous meeting were approved.

The treasurer's report was read and accepted.

A list of suggested personnel for the Committees of the Institute was presented, and suggestions were made for adding several names to increase the representation of various chapters.

The qualifications for Fellow mem-

bership were discussed. The question was raised as to whether Fellow membership standards had not been lowered, and several cases were mentioned where certain Fellows apparently had less qualifications than those of other persons who were Members (not Fellows) of the Institute. On the opposite side, other cases were cited where men of long and responsible experience hesitated to apply for Fellow membership because they did not meet the educational requirements set for Fellow. These latter are eligible for Fellowship inasmuch as the Council may consider qualifications other than those specified for Fellowship. Dr. Hill maintained that this was not understood by the majority of prospective members, and that the leaflet giving information about the Institute should be rewritten to include the specific references.

President Egloff appointed a Committee to make a study of the qualifications for Institute membership, to consist of Dr. Hill as Chairman, Dr. A. Lloyd Taylor and Dr. Hessel.

Upon motion made and seconded, the secretary was requested to write to the Chairmen of the Chapters, sending them the names of applicants for membership from their territories, with the request that the Chairman approve the application for membership.

Upon motion made and seconded, the Secretary was requested to send a form asking for additional information since election, to all Members of the Institute. When these forms are returned, the Committee on Qualifications is to inspect them to determine whether the Member has had sufficient experience since his election to the Institute to apply for Fellow membership. If so, he will be invited to apply for a change of status.

Dr. Egloff stated that 260 individuals and groups were regularly receiving information from him about matters of interest to the professional scientists, such as patent information, copies of THE CHEMIST, etc.

Dr. Hill stated that many prospective members were under the impression that the Institute was an organization to promote labor unions. Dr. Egloff informed the Council that this erroneous rumor had been current for some time, and that our answer is that the Institute is not a labor union: that it does not want to belong to a labor union; that it has no sympathy with labor unions for the professional man. The Institute does want to raise the professional status of the chemist by professional means. Upon motion made and seconded, this statement was approved by the Council.

Upon motion made and seconded, the following new members were elected:

Fellows

Bell, Robert H.

(1944), *Vice-president and Research Director,* Lucius Pitkin, Inc., 47 Fulton Street, New York, N. Y.

Braidech, Mathew M.
(1944), *Professor of Industrial and Sanitary Chemistry,* Case School of Applied Science, University Circle, Cleveland, Ohio.

Cohen, Samuel J.
(1944), *President* of Amecco Chemicals, Inc., Rochester, New York, *President* of Hardesty Chemical Corporation, New York, N. Y.

Dean, John G.
(1944), *Industrial Fellow,* Mellon Institute, Pittsburgh 13, Pennsylvania.

Earhart, Kenneth A.
(1944), 725 Greenwood Road, Union, New Jersey.

Grafton, Corydon M.
(1944), *Director* of Research, Cordo Chemical Corporation, Norwalk, Conn.

Harber, William I.
(1944), *Research Chemist,* Witco Chemical Company, Chicago, Illinois.

Knowles, John T.
(1944), *Manager of Research and Quality Control,* Libby, McNeil and Libby, Blue Island, Illinois.

Kurt, O. Edward
(1944), *Manager of Development Section,* Ethyl Corporation, Baton Rouge, Louisiana.

Leffer, Frederick A.
(1944), *Manager of Foreign Patent Department,* Universal Oil Products Company, 310 South Michigan Avenue, Chicago, Illinois.

Lutz, J. George
(1944), *Professor of Chemistry,* Hofstra College, Hempstead, New York.

MacKenzie, Charles A.
(1944), *Research Chemist,* Montclair Research Corporation, Montclair, N. J.

Miller, Edward C.
(1944), *Director of Research and Development,* Brown Linseed Company, Staten Island, New York.

Murphy, John A.
(1944, *Plant Manager,* Brooklyn Varnish Manufacturing Company, 35 Nostrand Avenue, Brooklyn, N. Y.

Neill, William J.
(1944), *Director of Research,* Columbus Metal Products Co., Inc., Columbus 8, Ohio.

Quill, Laurence L.
(1944), *Department of Chemistry,* University of Kentucky, Lexington 28, Ky.

Rostenbach, Royal E.
(1944), *Technical Assistant,* Synthetic Rubber Production Department, Rubber Reserve, R.F.C., Washington 25, D. C.

Rissetto, Arthur J.
(1944), *Plant Chemist,* in charge of production, Zonite Products Corporation, New Brunswick, N. J.

Sahyun, Melville
(1944), *Director of Research,* Frederick Stearns and Company, Detroit, Mich.

Schuyten, Hartwig A.
(1944), *Instructor in Chemistry,* Loyola University, Chief Chemist, Pittsburgh Testing Lab., New Orleans, La.

Servis, Richard J.
(1944), *Chemical Engineer,* Winthrop Chemical Company, Rensselaer, N. Y.

Vagenius, Harold N.
(1944), *Patent Attorney,* the firm of Charles W. Hills, Chicago, Illinois.

Wagner, L. Frank
(1944), *Chief Chemist,* A. Wilhelm Company, Reading, Penn.

Yourtee, John A.
(1944), *Research Chemist,* Sylvania Industrial Corporation, Fredericksburg, Virginia.

Young, James H.
(1944), *Research Chemist,* Anaconda Wire and Cable Company, Marion, Ind.

Member

Cooke, Lloyd M.
(M.1944), *Research Department,* Corn Products Refining Company, Argo, Ill.

For Associate

Spialter, Leonard
(A.1944), *Chemist,* Ellis-Foster Company, Montclair, N. J.

Raised To Fellow

Dixon, John G.
(1944), *Chemist,* Anaconda Wire and Cable Co., Marion, Ind.

Frishe, William C.
(1944), *Assistant Professor of Chemical Engineering,* Alabama Polytechnic Institute, Auburn, Alabama.

Gorman, Leo I.
(1944), *Rubber Chemist,* Anaconda Wire & Cable Company, Marion, Ind.

Luckens, Mark M.
(1944), *Laboratory Owner,* 1st Lt., Sn. C., Station Hospital, Champ Shelby, Mississippi.

Pinkston, John T.
(1944), *Research Chemist,* Universal Oil Products Co., Riverside, Illinois.

Upon motion made and seconded, it was decided that hereafter the Secretary shall ask delinquent members who owe one year's dues to communicate with the Institute within thirty days or they will be subject to being dropped.

President Egloff read a letter from the Institute Cubano de Estudios Quimicos who are commemorating on July sixth the tenth anniversary of Mme. Curie's death. The Secretary was requested to acknowledge the letter and to inform the organization that we sincerely concur in their action.

Upon motion made and seconded the following Fellows were elected to Life membership: S. D. Averitt, Minnie Graham, and J. N. Taylor.

The secretary was requested to ask the engraver to speed up the engraving of members' certificates.

The roster of members, to be published this Fall, was discussed and plans made for giving advertisers an opportunity to take advantage of the permanency of the roster to keep their message before Institute members.

The date of the next Council meeting was set for Thursday, July 27th.

There being no further business, adjournment was taken.

July Meeting

A MEETING of the National Council of THE AMERICAN INSTITUTE OF CHEMISTS was held on Thursday, July 27, 1944, at the Chemists' Club, 52 East 41st Street, New York, N. Y. at 6:30 p. m. with vice-president Donald Price presiding.

The following officers and councilors were present:

Messrs: H. L. Fisher, F. A. Hessel, W. H. Hill, R. E. Kirk, J. M. McIlvain, H. S. Neiman, D. Price, and F. D. Snell. Miss V. F. Kimball was present.

The minutes of the previous meeting were approved.

The treasurer's report was read and accepted.

A letter from Dr. Egloff was read in which he asked the Council to consider several matters.

In accordance with a suggestion from Dr. Harold A. Levey, the secretary was requested to write the chairman of committees that it might be well to hold committee meetings during the time of the American Chemical Society Convention in New York, so that out-of-town committee members, who would be at the ACS meetings, could also have an opportunity to meet with the Institute committees.

Upon motion made and seconded, William J. Sparks, F.A.I.C. was elected to Life membership.

A letter from Dr. R. J. Abernethy was discussed briefly and referred to a later meeting of the Council.

Upon motion made and seconded, the following new members were elected.

Fellows

Benoit, Constant A.

(1944), *President,* Permatex Company, Inc., 1720 Avenue Y, Brooklyn, N. Y.

Bergren, William R.

(1944), *Captain,* Surgeon Hq., Inter. Sec., APO. 503, San Francisco, Calif.

Block, Paul, Jr.

(1944), *Industrial Fellow,* Mellon Institute, 4400 Fifth Avenue, Pittsburgh, Pennsylvania.

Carlson, Warner W.

(1944), *Research Fellow,* Mellon Institute, 4400 Fifth Avenue, Pittsburgh, Pennsylvania.

Glaser, Elizabeth B.

(1944), *Professor of Chemistry,* Immaculate Heart College, 2021 N. Hestern Avenue, Hollywood, California.

McCrosky, Carl R.

(1944), *Professor Head of Chemistry Department,* Syracuse University, Syracuse, N. Y.

Ott, Emil

(1944), *Director of Research,* Hercules Powder Company, Wilmington 99, Del.

Park, James G.

(1944), *Vice President,* Standard Alcohol Comany, 26 Broadway, Room 2811, New York 4, N. Y.

Rippie, Charles W.

(1944), *Supervisor, Technical Service,* Diamond Alkali Company, Painesville, Ohio.

Schwarcman, Alexander

(1944), *Research Director,* Spencer Kellogg & Sons, Inc., Buffalo, N. Y.

Members

Eubank, William R.

(1944), *Fellow of Industrial Research,* Mellon Institute, 4400 Fifth Avenue, Pittsburgh, Pennsylvania.

Gill, M. Mignon
(1944), *Assistant Librarian,* Universal Oil Products Company, Riverside, Ill.

Upson, Willard I.
(1944), *Director,* Analytical Chemists of Cincinnati, 4 West 7th Street, Cincinnati, Ohio.

West, Charles P.
(1944), U. S. Instrument Company, 421 West 54th Street, New York, N. Y.

Raised To Fellow From Member

Nee, John W.
(1944), *Chemist,* Roxalin Flexible Finishes, Inc., 800 Magnolia Avenue, Elizabeth, New Jersey.

CHAPTERS

Baltimore

Chairman, Albin H. Warth *Vice-chairman,* Walter H. Hartung
Secretary-treasurer, Edward M. Hanzely
3816 Kimble Road
Baltimore 18, Maryland
Council Representative, Maurice Siegel
News Reporter to THE CHEMIST, Ralph Lamenzo

Chicago

Chairman, Hilton I. Jones *Vice-chairman,* Robert J. Gnaedinger
Secretary-treasurer, Charles L. Thomas
Universal Oil Products Company
Riverside, Illinois
Council Representative, Gene Abson

THE Chapter's Annual Meeting was held June second at Huyler's Restaurant, 300 South Michigan Avenue, Chicago with Dr. Hilton Ira Jones presiding.

The following chapter officers were elected: Chairman: Hilton Ira Jones; Vice-chairman: Robert J. Gnaedinger; Secretary-treasurer: Charles L. Thomas; Council Representative: Gene Abson; Councilors: Robert F. Baldaste (newly elected), Frank B. Burns, Martin DeSimo, Albert K. Epstein, Robert B. Harper, V. I. Komarewsky, Anderson W. Ralston, and Vanderveer Voorhees.

Charles L. Thomas presented the Treasurer's report. It was moved, seconded, and unanimously passed that the Secretary write to the Universal Oil Products Company and express the gratitude of the Chapter for the

contributions of this company towards defraying the printing and mailing costs for the Chapter during the year 1943-44.

Dr. Gustav Egloff reported briefly on the National Meeting in New York.

Dr. H. I. Jones announced that we are beginning to plan for our Testimonial Dinner in the fall and named the following committee for the selection of the individual to be honored.

Chairman: Dr. H. R. Kraybill, H. E. Dietrich, R. F. Baldaste, C. A. Johnson, B. E. Schaar, Otto Reinmuth, and H. S. Bloch.

Dr. Jones also announced the following committee on arrangements for this dinner: Chairman: Dr. C. L. Thomas, F. B. Burns, and A. W. Ralston.

The main speaker of the evening was Mr. George I. Haight who spoke on "How We Do It." This was followed by short comments by Mr. F. W. Leffer on "How About the Lawyer in Germany" and by Mr. J. G. Tolpin on "The Status of the Lawyer in Russia." The meeting was then thrown open for discussion and Dr. Eisenschiml, Dr. H. A. Wagner, and Mr. L. J. Jacobson took a vigorous part in it. This discussion will be published in a forthcoming issue of THE CHEMIST.

Los Angeles

Chairman, R. J. Abernethy

Secretary-treasurer, Imo Baughman Simpson
638 N. Kenmore Avenue
Los Angeles, California

THE June meeting was held on the fifteenth at Clifton's Cafeteria, Los Angeles, Mr. R. J. Abernethy, chairman presiding.

Dr. Albert Salathe read letters from headquarters pertaining to governmental and union classification of chemists as common labor.

Mr. Abernethy suggested consideration of a method of circulation of chapter correspondence among the membership.

Mr. Abernethy read a letter he wrote to the American Chemical Society in regard to committee on unionization, urging attention to professional programs.

Mr. Milner reported on a survey he is making of professional methods and the set-up of the medical profession and suggested that someone make a similar study of the legal profession. A local doctor pays $53 in dues to medical societies—a chemist would faint at such an expenditure!

Major Ficklen reported on the for-

mation of industrial hygiene chemists into a professional group. Mr. Abernethy outlined a program of listing definite objectives for the members to work on, a program all could know and assist. Major Ficklen was assigned to report on the responsibility of the chemist to his employer. Dr. Salathe was given the task of initiating a professional program in the schools and colleges. It was felt that professors should do more to inculcate the professional attitude in their product, the young chemist.

THE July meeting of the Los Angeles Chapter was held on the 20th, in the Monterey Room of Clifton's Cafeteria on South Broadway. Ten members and one visitor were present. R. J. Abernethy was in the chair.

Numerous letters from headquarters were circulated among the members. Members were urged to make suggestions to headquarters as well as to each other. Mr. Greenhood reported fully on the Annual Meeting in New York which he attended and also on a meeting of the Chicago chapter.

It was urged that each member work on a project such as a survey of chemists in Southern California, the Kilgore Bill or Licensing. We have passed the first stage and are in the second, the fact-finding stage; later we will apply and use the facts in the third stage.

Louisiana

Chairman, D. F. J. Lynch *Vice-chairman*, C. S. Williamson, Jr.
Secretary-treasurer, J. David Reid
Southern Regional Research Laboratory
2100 Robert E. Lee Boulevard
New Orleans 19, Louisiana
Council Representative, Harold A. Levey
News Reporter to THE CHEMIST, Helen M. Robinson

Western Pennsylvania

President, Henry G. Goodman, Jr. *Vice-president*, Henry F. Smyth, Jr.
Secretary-treasurer, Jacqueline S. Front
Mellon Institute of Industrial Research
Pittsburgh 13, Pennsylvania
Council Representative, William H. Hill

Niagara

Chairman, M. R. Bhagwat *Vice-chairman,* Frederick L. Koethen

Secretary-treasurer, Frederick L. Sievenpiper
National Aniline Division
Allied Chemical and Dye Corporation
Buffalo, New York

Council Representative, Arthur W. Burwell

Alternate, Alvin F. Shepard

Reporter to THE CHEMIST, John E. Seubert

THE Niagara Chapter, met June twentieth at the Red Coach Inn, Niagara Falls, N. Y. for its final meeting of this season. During a brief business meeting presided over by Maurice C. Taylor, the following officers were elected:

Chairman, M. R. Bhagwat; Vice Chairman, F. L. Koethen; Secretary-Treasurer, Frederic L. Sievenpiper; Chapter Representative, Arthur W. Burwell, and Alternate, Alvin F. Shepard; Reporter to the CHEMIST, John E. Seubert.

Marvin J. Udy, vice president of Chrominum Smelting and Mining Company and a pioneer in chrominum plating and other metallurgical problems, spoke on "New Industrial Developments in the Northwest" based on a recently completed survey to determine the advisability of locating a plant in the area.

By an extensive trip to all important points, he secured actual data on power costs and contract terms, raw materials, water, freight, and market possibilities. Interpreted in the light of Mr. Udy's long experience in electro-metallurgy, the talk became an enlightening exposition of the basic principles of economic geography. Mr. Udy stated that "A chemical and metallurgical industry is rapidly developing in our Pacific Northwest due to the large amount of power being made available by the Bonneville and Grand Coulee Dams.

"This industry is centering to a large extent in Washington and Oregon. The Portland and Tacoma areas already have an imposing array of industries, as the following list shows. Companies now established in this area are: Hooker Electrochemical Company, Pennsylvania Salt Company, Lattemie Chemical Company, Olin Aluminum Company, Ohio Ferro Alloys Company, Electrometallurgical Company, Pacific Carbide Company, American Smelting and Refining Company, Crown Zellerbach Paper Company, Aluminum Company of America, and Reynolds Metals Company."

Power is the one plentiful raw material but power in itself is not enough. There must be cheap mate-

rials to be processed and above all an accessible market. Good quality coal and coke is not available at reasonable prices.

Limestone, quartz, and other mineral raw materials are located within the area but they are undeveloped to a large extent. The cost of opening a quarry for limestone, for instance, and building a road to it, while not too much for a large well established firm, is a serious drawback to a new plant struggling to get started.

After the war, anthracite can probably be imported cheaply from Indo-China. Utah coke is expensive, Chicago coke must bear a freight rate of $10.10 per ton. Delivering of finished products to the Eastern markets via the Panama Canal can be accomplished cheaply in large shipments but for a small concern this involves a serious tie-up of capital.

Power at two mils per KWH, coke at $10.00 per ton, and lime at $12.00 per ton, compared with power at four mils, coke breeze at $2.00 per ton, and lime at $7.00 per ton in the East, does not leave much margin when you are so far from large markets. In addition to the high cost of raw materials, transportation charges are a handicap. While the high cost of raw materials can be overcome, transportation is a more difficult problem.

In the future, the opening of local deposits of minerals, along with accessible foreign supplies, will reduce the cost of materials. Freight charges to a certain extent will be overcome. The real drawback to the development, except in the case of certain industries like aluminum, where very large amounts of power are required, is in the lack of markets that are large and are easily and economically accessible. Such markets depend for the most part on population.

The development is not unlike that of Niagara Falls from 1900 to 1915 when there was plenty of power. One difference is in the fact that power contracts offered by the Government in the Northwest, while at low rates, are not as flexible and accommodating to a struggling new industry in matters of readjustments of firm power, payment of bills, etc. as they were when Niagara's industries were in the early development stage.

But today we have a large chemical and metallugical industry with the "know-how" which had to be developed the hard way at Niagara. With this background and the large companies already establishing subsidiaries in the Northwest, continued development is assured. Its progress will be governed to a large extent by the rate of increase of population and improved and cheaper transportation facilities which will make markets accessible.

Fortune magazine for July carried articles on the postwar possibilities of the rubber and automotive industries.

Pennsylvania

Chairman, Glenn E. Ullyot
Secretary-treasurer, Kenneth E. Shull
23 Bala Avenue
Bala Cynwyd, Pennsylvania
Council Representative, John M. McIlvain

A MEETING was held on April 25th, at the Philadelphia College of Pharmacy and Science, preceded by an informal dinner.

The speaker was Dr. Ivor Griffith, president of the Philadelphia College of Pharmacy and Science and of the American Pharmaceutical Association. Dr. Griffith discussed "Research in Pharmacy."

" 'Pharmacy,' so Remington wrote, 'is the science which treats of medicinal sciences. It embraces not only a knowledge of medicines and the art of preparing and dispensing them, but also their identification, selection, preservation, combination, analysis and standardization.'

"To me the word standardization is the most important except perhaps that the word 'research' per se should be included as defining an extremely important phase of modern pharmacy. Indeed of all the industries, the drug industry was the first to realize that organized, systematized research had to be fostered and well financed in order to develop the art and science of pharmacy to its greatest peak of service.

Long before the textile trades, the metallurgical industries, and other key industries, had thought of conducting a bold program of research, manufacturing pharmacy had done so. Parke Davis and Company of Detroit, Michigan, had a research department, and an active one, operating on its own budget as far back as about 1880. Today no large manufacturing house is without a research division dedicated to both pure and applied research.

"Then, too, there is the research that leads to standardization methods and which in these days of large scale production in drug manufacture is an absolute necessity. The new drug laws have proven convincingly the need of such research and such standardization. The day of the old apothecary is gone, and while the corner drug store still has a great opportunity for public service, and it is a service of sound professional caliber, the *pharmacy* of today is the *pharmacy* of the large manufacturing house.

"Plasters, once clumsily spread on a few inches of cloth, are now machined by the mile; capsules, then dozened by hand (and not too accurately), are now precisely milled and millioned; elixirs, lotions, pastes and un-

guents are no longer thimbleful things, but tanked and vatted in terms of unbelievable gallonage and tonnage. This is indeed the day of mass manufacture of medicines and the day of careful standardized production.

"Likewise it is a day upon whose lintel is a beckoning challenge to new developments, new devices, new products, and new ways of thinking, all of which means RESEARCH. Said Pasteur: 'Take interest, I implore you, in those sacred dwellings which are designated by the expressive term laboratories. Demand that they be multiplied, that they be adorned; these are the temples of the future—temples of well-being and of happiness. And there it is that humanity grows greater, stronger, better.'

"The pharmaceutical profession has answered Pasteur's ringing request with as much fervor and intelligence as any profession in the field. Into this research administration has been applied every agency and every branch of science that could lend a helping hand. All of the services of chemistry, in theory and in practice, have been utilized; colloid chemistry, physical chemistry, micro-chemistry, the chemistry involved in dead as well as in living changes, the chemistry of breaking down and the chemistry of putting together.

"Physics, mathematics, engineering principles, statistical tecniques, all of these forces have been welded together in the search for the manner and matter of medicine. Yet, despite the advances of modern chemistry, there are still many drugs which can only be accurately evaluated by determining their effect upon living tissues.

"Diversified studies are now being made by hundreds of research workers in pharmacy whereby the medicinal virtues of botanicals, biologicals, and natural and synthetic organic structures will be preserved intact and for a reasonably long time in their various preparations. Biologic chemistry has advanced far afield in the course of the last few decades.

"For instance, there is insulin and the gland substances whose analysis made possible their synthesis and whose application in the treatment of disease has taken great burdens of pain from the shoulders of suffering men. There are the vitamins, which should have been called *vita-needs* in the interest of accuracy. They have been found, analyzed, and synthesized, and so multiplied in their number that the alphabet has been forced to call numerology to its labelling assistance. Vitamin B was once a good enough label, but now the complex has given brith to its ever-increasing brood of simples.

"From this parentage have come thiamine, nicotinic acid, lactoflavin, riboflavin and others to come. Recall the research connected with liver products, and how quickly manufacturing pharmacy stepped in with large-scale production when test-tube methods

no longer availed. Totally inadequate is our talent or time to describe the galaxy of antiseptics and chemotherapeutic agents uncovered in the last few decades of research.

"More recently the outstanding agents of this kind, in promise and in performance, are sulfanilimide and the other sulfamiracle drugs, materials that have already revolutionized the treatment of many diseases. Then remember the God-given anesthetics and analgesics. The barbiturates alone are tribute enough to ingenuity in productive research in the field suggested by the phrase 'God giveth his beloved sleep.'

"Those who think of evolution as progress frequently forget that the projecting curve carries on into the long tomorrows, and perhaps with an acceleration of its pace. Could I sit a hundred years hence and think of the meantime progress in research and achievement in the healing arts, I would more than likely be stunned by its results and by its pace."

At the close of his talk, Dr. Griffith showed many of the more recently developed pharmaceutical preparations—results of research.

Washington

President, L. F. Rader, Jr.

Vice-president, L. R. Heiss *Treasurer,* T. H. Tremearne

Secretary, Ernest J. Umberger

207 Albany Avenue, Takoma Park, Maryland

News Reporter to THE CHEMIST, S. W. Griffin

Council Representative, T. H. Tremearne

I. F. Laucks, Inc., Seattle, Washington, the newest member of the Monsanto family, has been awarded a second renewal of the Army-Navy "E" award, in recognition of their accomplishments in the field of synthetic resins, water-proof plywood, and protective coatings, for the armed forces.

Mr. and and Mrs. M. R. Bhagwat announce the birth of a daughter, Bonnie Jean, on August seventeenth. Mr. Bhagwat, is chairman of the Niagara Chapter of THE AMERICAN INSTITUTE OF CHEMISTS, and holds the position of chemical engineer for the Mathieson Alkali Works, Inc., at Niagara Falls, N. Y.

WOOD CHEMISTRY

Edited by Louis E. Wise

Institute of Paper Chemistry, Appleton, Wisconsin

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L. F. Hawley

American Chemical Society Monograph No. 97

So rapid has been the development of wood and cellulose chemistry in the last 15 years that no mere revision of "The Chemistry of Wood" published in 1926, was considered adequate. This is an entirely new treatise, written under the editorship of Dr. Louis E. Wise, in which all the vast complexity of the subject is discussed and to a great extent resolved by the outstanding authorities in the field. This is indeed an invaluable compendium of up-to-date information in both theoretical and practical aspects of this vital subject in which new discoveries and techniques have recently been reported in leading scientific journals. It will be of great importance to organic chemists generally, and to research workers in the pulp and paper rayon, cotton and wood-products industries.

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For Your Library

PHYSICAL BIOCHEMISTRY. Henry B. Bull. *John Wiley & Sons.* 347 pp. 5¾" x 8½". $3.75.

Physical Biochemistry is physical chemistry applied to biology. Living structures, consisting of membrane within membrane, call upon all available knowledge for explanations of the phenomena associated with life. Tracer isotopes require a knowledge of atomic structure. Chemical reactions involve kinetics, thermodynamics, catalysis, enzyme action, and electrochemical manifestations. Diffusion, osmosis, and permeability are approached from many angles. Interesting is the diagram of cell mechanism, utilizing conjugate vacuoles to illustrate the free energy change in osmotic action. Together with the concept of heterogeneous cell walls, on mosaic structure, special portals of nutrition and elimination are indicated. Change in this structure of the cell wall should be of interest to pathologists to explain the nature of cancer cells, etc.

ELECTRONIC INTERPRETATIONS OF ORGANIC CHEMISTRY. A. R. Remick. *John Wiley & Sons.* 474 pp. 5¾" x 8½". $4.50.

This book is a continuation of the work started by Fry, Nelson and Falk. The static concept of the electronic structure of the atom is conservatively maintained and the data are marshalled in its support. Points of practical interest are interspersed among hypotheses and amplified by experimental data. Among these are the peroxide effect on olefines, onium compounds, the hydrogen bridge and dipole moments, chelate rings, tautomerism, resonance activation, thermal decomposition of hydrocarbons, solvent effect, and mechanisms of reactions.

The electrical properties of the ultimate particles of atoms create a close association of electrical phenomena and chemical composition.

AN OUTLINE OF THE CHEMISTRY OF CARBOHYDRATES. By Ed. F. Degering, F.A.I.C., Department of Chemistry, Purdue University. 1943. 474 pp. 6" x 9".

Dr. Degering and his graduate students at Purdue collected data over a period of years in connection with the development of a course at graduate level in the chemistry of carbohydrates, and this material is summarized in this outline.

The book is planographed (not printed) with cloth bound covers.

The Outline is primarily designed to serve as a text for the course at Purdue, but will be interesting to other educational institutions and to workers in carbohydrates.

Popular Chemical Education

Cornelia T. Snell, Ph.D.
Co-author of "Chemistry Made Easy"

THE question is asked not infrequently about such books as "Chemistry Made Easy," whether these are designed to popularize chemistry or to educate chemists. They are really chemistry in everyday clothes, the simple fundamentals with homely applications from everyday life. The reader will no more become a chemist as a result of this study than will the person who has merely completed general chemistry and a brief lecture course in organic chemistry.

It is thought that the set of books will satisfy the intellectual curiosity of those who wish to study this particular branch of science—perhaps for business reasons, perhaps for cultural reasons, to keep in step with the times, or to put their college chemistry of twenty or thirty years ago on a more modern footing.

This trend of intelligent people toward more and more serious reading and even serious study is evidenced by the material published in the daily pages of our better-class newspapers. Scientific articles and findings of many kinds are reported there with enough of the story in non-technical terms so that the whole becomes understandable. People are keen for more knowledge, keen to give themselves a broader back-ground of understanding, keen to have a better grasp of what goes on in the creative world of science.

Perhaps these small books will contribute one step toward a more general understanding of how matter is put together and of how its parts can be built into new compounds and new materials. It is axiomatic that a better comprehension of what chemistry is, by more and more people, will operate to the advantage of those who have made chemistry their profession.

People in general hold the professions of medicine and law in high regard, because they have some inkling as to what they are about. If they have the same degree of understanding concerning chemistry, it seems reasonable that it also will be put among the honored professions in the mind of the public, a state which all of us as chemists would like to bring about.

⊕

"Special Aids for Placing Military Personnel in Civilian Jobs" is the title of a 500-page volume published by the War Manpower Commission. It lists ten thousand civilian jobs relating to military occupations for returning veterans and is to be used in the United States Employment Offices and by interested employers. It may be obtained from the Government Printing Office, Washington, D. C.

Quinine, Soldiers, Cartels, Scientists

(Reprinted with permission of "The Dayton Herald")

IT is reported that a chemical process has been perfected for the duplication of quinine. The new product is not a substitute for quinine, it is quinine, but not produced from cinchona bark.

The discovery is to be acclaimed on a variety of grounds. It is a godsend for our men in the malarial areas of the Pacific, who have been suffering grievously because of the quinine shortage—a shortage due primarily to restricted production of quinine in peace time and aggravated now by the Japanese seizure of the Dutch East Indies, the chief source of natural quinine.

The discovery disposes of the future of one international cartel. Quinine is a very valuable therapeutic agent, and its restricted production in peace time was designed to keep prices at a certain level. The means employed was a cartel in which nationals of several countries participated.

The quinine cartel is the second contrivance of this sort whose future has been imperiled by the reaction of American science and industry to the needs of war. The other is the rubber cartel. A short time ago it was announced that the production of synthetic rubber in this country had reached the point where we can dispense with the natural substance.

The developments are to be welcomed. Cartels are frankly schemes in restraint of trade. It remains now for those exploited by the quinine and rubber cartels in the past to see to it that the production of chemical quinine and synthetic rubber shall not fall into hands which will impose uneconomic restrictions.

Another aspect of the discovery of chemical quinine worthy of remark is that the discoverers are two young scientists, one twenty seven years old and the other twenty six. These young men have achieved what scientists have been trying to do for a century. Both of them are within the draft-age category most highly prized by our military authorities.

We do not know why they were granted deferment. But whatever the reason, universal thanks is in order. The new quinine will save countless lives of our soldiers and sailors, as well as of civilians. It is doubtful if any two of our young men in the armed services have performed a more valuable service. Yet comparisons are odious, especially here where the bases are so widely different.

Witco Chemical Company announces "Witco No. 673 Rust Inhibitor," a rust preventative coating for protection of metal parts and equipment during storage and shipment.

New Industrial Films

Goetze Gasket and Packing Company, Inc., New Brunswick, New Jersey, announce a new film available to technical groups, etc., entitled, "Only a Gasket." This 35-minute, color film, carries a commentary by Lowell Thomas.

* * *

The Cellulose Products Department of Hercules Powder Company has just issued a 56 page, 8½"x11", booklet which presents information on the properties and uses of soluble nitrocellulose, as an aid to manufacturers using this material or interested in its possible applications.

* * *

A. P. de Sanno and Son, Inc., Machine Sales Division, Philadelphia, Penna., manufacturers of Radiac Abrasive Cut-Off Machines and discs, will make available to engineering societies, training schools, and manufacturers a 16 mm. sound film entitled "Speed in Cutting", with narration by Lowell Thomas.

Textile Research for August, 1944, features an article on "Studies in Water-Repellent Pyridinium Compounds" by Ernest Zerner and Peter I. Pollak, of the Warwick Chemical Corporation's research laboratories.

The American Society for Testing Materials, 260 South Broad Street, Philadelphia 2, Pennsylvania, has published a "Symposium on the Applications of Synthetic Rubbers," which comprises technical papers presented at its Cincinnati meeting.

Copies of this 140-page pamphlet may be ordered directly from the society at a cost per copy of $1.75 (cloth binding) or $1.50 (paper binding).

New Chemical Bulletin

The Delaware section of the American Chemical Society will publish a local section organ, beginning with the October issue, to be known as "The Del-Chem Bulletin," address P. O. Box 47, Wilmington, Delaware. Dr. C. J. Krister is the editor.

In a message of congratulation, Dr. Egloff stated, "Delaware, a great research center, is worthy of this publication dedicated to the interests of chemists and chemical industry. The councilors and officers of THE AMERICAN INSTITUTE OF CHEMISTS wish the highest success to this new and important venture."

Chemical Developments Corporation, Dayton, Ohio, are issuing a leaflet called "Chemical Developments." The first number, dated Summer-1944, contains brief discussions about protective wrinkle coatings, and powder metallurgy.

Delaware Fellowship Continued

G. L. Schuster, director of the Agricultural Experiment Station, University of Delaware, announces that the annual fellowship in the Department of Entomology, University of Delaware, will be continued. The fellowship carries a $10,000 grant this year.

Work on the fellowship, sponsored by Hercules Powder Company, will be under the direction of Dr. Paul L. Rice, acting head of the Entomology Department, and will be primarily concerned with "screening" tests on new compounds developed at Hercules Experiment Station. Research work on the compounds will be handled by Arnold Mallis, Hercules Fellow, and his assistants.

The secretary of Commerce, Jesse H. Jones, announces that the statistical service of the U. S. Department of Commerce, temporarily curtailed during the war, will be re-established for business and industry as soon as requirements for military security will permit.

The Standard Oil Company (New Jersey), 30 Rockefeller Plaza, New York 20, N. Y., has issued a booklet entitled "Oil for the World" which discusses the need for an enlightened world oil policy.

Dr. Gustav Egloff, President
THE AMERICAN INSTITUTE
OF CHEMISTS
Dear Dr. Egloff:

I was glad to see that THE CHEMIST carried the Dow address, "the meaning of Freedom," and I wish that article might have received even wider circulation, especially the parts dealing with Dow's research attitude. I wish every research director would pin Dow's statement, "We have learned that if a research laboratory is to produce results, the men must be allowed the freedom to be a bit crazy" —in his hat, and take his hat off every once in a while.

C. J. KRISTER, Editor
The Del-Chem Bulletin

Higgins New Chairman of Board of Hercules

Russell H. Dunham has resigned as chairman of the board of directors of Hercules Powder Company. Charles A. Higgins, president, was then elected chairman of the board. Mr. Dunham will remain as director and chairman of the finance committee.

The United States Department of Agriculture and the Canadian Departmetn of Agriculture are co-operating on tests of aircraft spraying to control the spruce budworm infestation, now in Ontario and Quebec, which threatens New England and Lake States forests.

Hercules Powder Company, Wilmington, Delaware, has used Basic English to write a new booklet on "Thanite—Quick Death to Insects." Hercules plans to use it to increase its international insecticide trade after the war.

Witco Chemical Company's Research Laboratories, 6200 W. 51st Street, Chicago, Illinois, have issued the first of a new series of technical bulletins on the subject of Continex SRF, a new semi-reinforcing furnace black. This bulletin introduces Continex SRF and compares it with other carbon blacks in GR-S and natural rubber.

Positions Available

FOOD CHEMIST wanted, with experience in packing fish products, to establish experimental station in Maine. Please reply to Box 91, THE CHEMIST.

MAN capable of formulating wood finishing materials, particularly all types of wood stains and wood fillers. Specialized experience necessary. Salary range $225-$275 month.

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SENIOR CHEMIST to formulate industrial protective coatings. Salary range $250-300 month.

LABORATORY ASSISTANTS (2). Male or female. Previous industrial training needed. To act as assistants to senior chemists. Salary range $150-200 month.

LABORATORY ASSISTANTS (3). Male or female. No previous industrial experience necessary. To act as general laboratory assistants. Salary range $100-$150.

For the above positions please reply to Box 93, THE CHEMIST.

Meeting Dates

September 11-15. American Chemical Society, 108th Meeting, Hotel Pennsylvania, New York, N. Y.

October 5-7. National Electronic Conference, Medinah Club, Chicago, Illinois.

October 6. Chicago Chapter, THE AMERICAN INSTITUTE OF CHEMISTS. Morrison Hotel, Chicago. Testimonial Dinner to Dr. R. B. Harper, Vice President, Peoples Gas, Light and Coke Company.

October 12-14. American Association of Textile Chemists and Colorists, Annual Meeting, Claridge Hotel, Atlantic City, New Jersey.

October 12-14. Electrochemical Society, Inc., Hotel Statler, Buffalo, New York.

Nov. 15-19. National Chemical Exposition, Coliseum, Chicago, Ill.

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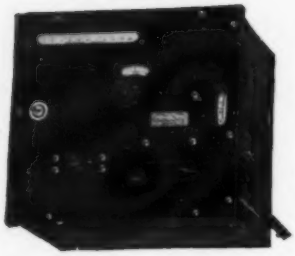

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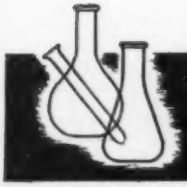

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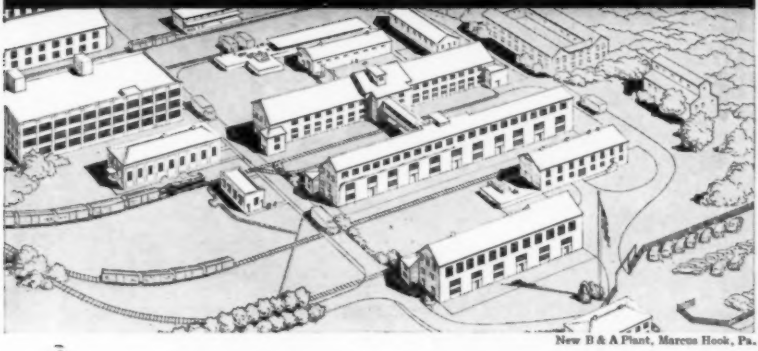

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